



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

**Analysis of Base Services Structure and Development of Cost-Saving
Strategies to Counterattack Decreasing Funding Levels**

**By: Daniel G. Rieck,
Rex L. Curtin, and
Corey S. McCollum
December 2005**

**Advisors: Richard L. Dawe,
Donald E. Summers**

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COST-SAVING STRATEGIES TO COUNTERATTACK DECREASING
FUNDING LEVELS**

Daniel G. Rieck, Commander, United States Navy
Rex L. Curtin, Commander, United States Navy
Corey S. McCollum, Lieutenant, United States Navy

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Authors: Daniel G. Rieck
Rex L. Curtin
Corey S. McCollum

Approved by: Richard L. Dawe
Thesis Advisor

Donald E. Summers
Co-Advisor

Robert N. Beck, Dean
Graduate School of Business and Public Policy

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I. INTRODUCTION/PROBLEM DESCRIPTION

A. PURPOSE

A primary goal of military installations is, or at least should be maximizing efficiency and being good stewards of tax dollars. All government organizations are faced with reduced budgets and fiscal constraints. This causes tough decisions to be made about how to plan budgets and which programs to fund. The Department of Defense (DoD) has shown a commitment to streamlining organizations, instituting 'best business practices' and seeking to transform all aspects of the military to reap the benefits of increased efficiency. This problem is immense in scope and could be the subject of endless studies.

The Naval Postgraduate School is not immune to this problem. During the upcoming Fiscal Year, they face budget cuts, and need to increase efficiencies in numerous areas. One area that will affect the school's stakeholders is the reduction of 25 percent for FY (06) in the area of 'services.' To be more specific, services means grounds maintenance, pest/animal control, and custodial contracts. While this may seem inconsequential, the base expenditure for services at Naval Postgraduate School amounts to approximately \$2,000,000, and a cut of 25 percent is approximately \$500,000. And, as with any service that affects 'stakeholders,' any decrease in the amounts expended will have an affect on those who receive the services.

Our team felt that this was an opportunity to incorporate areas of our academic work at the school, and combine that with our experience in the Navy to develop a business case solution to the problem. This will enable the 'decision makers' to make decisions based on data derived from the various stakeholder groups to develop and execute a new expenditure strategy.

A problem for some organizations is the lack of financial/strategic management skills to incorporate the latest developments in these fields to increase the efficiency of the organization. The stressors of the work environment and routine personnel changes leave any staff the unpleasant situation of focusing on the nearest problem instead of

being able to take the time to develop a better long term strategy. This makes it more difficult to streamline an organization and put performance measurements in place to guide and assess the effectiveness of the organization. This is not an indictment of any organization or group, but a fact of life.

The purpose of this project is to examine the problem and help find a solution that is based on the needs of the stakeholders. The scope of the project is broad, and hopefully will spur other individuals/groups to seek other ways to assist military organizations in increasing efficiencies. When we studied the problem, we found that there are efficiencies to be gained everywhere, and it is all stakeholders' responsibilities to contribute to the solution. We also found that there are a lot of resources available to bases to increase efficiencies, but time constraints make it difficult to utilize them.

When examining the problem, we found that an organization's dimensions need to be examined; that is to say stakeholders need to be identified. We also found that inefficiencies in the Public Works departments need to be identified; but those are best identified internally in the department. We found that the values of these services need to be determined; but when dealing with intangible items like aesthetics, and intrinsic values; that assessment can only come from the stakeholders that benefit from these intangible items.

What NPS and most bases lack is the continuity of city planners that will be in managerial positions for the long term, relatively stable budgets, and the ability to develop long term strategies to increase efficiency. When we made that correlation, it led us to look at how NPS should make decisions in this environment. We did that through analyzing lessons learned from successful organizations across the country and incorporated the DoD's preferred method of handling decisions of choice; which is a Cost Benefit Analysis.

While we hope that this study will provide valuable information and assistance for organizations desiring to develop data based solutions; most military organizations don't have the luxury of having students available to study a problem. This made us tailor the project to develop a product that can be used by anyone who needs assistance in

developing strategies and measuring performance. We hope that by using this, they will be able to determine the best ways to look at their internal organization, analyze their stakeholders, develop value measurements for intangible items, and report that data to the stakeholders in an effective manner. While this may not be the perfect solution, it will at least be informative to the stakeholders in the understanding of the problem and give them an opportunity to buy-in, and better support the solution.

B. RESEARCH QUESTIONS

The following is a list of the research questions addressed by this project:

- Given decreasing budgets and financial constraints, what is the best strategy to analyze an expenditure strategy for base services?
- How is a base's efficiency measured?
- Who are the stakeholders for services at NPS?
- How do you determine value of services like Custodial, Grounds Maintenance, and Pest Control?
- Are there cost saving strategies available that exist through an assessment of stakeholder values?
- How should an organization incorporate Performance Controls and Measurement techniques?
- How are services ranked in order of importance? How is value assessed to a service? How should it be assessed?
- How should an organization survey its stakeholders to determine the level of importance placed upon services?

C. ORGANIZATION OF STUDY

This project is organized in nine chapters.

CHAPTER I – Presents a brief description of the problem, the research questions used to tailor the research and the methods used to complete the project.

CHAPTER II – Introduces the stakeholders that are affected by and through the actions of the Public Works department. These stakeholders are internal to the department, and external; staff, faculty and students at the Naval Postgraduate School and the local community.

CHAPTER III – Discusses how a base is measured for efficiency. This briefly highlights comparison methods used by the Naval Region to grant funding. Additionally, this provides a basis for the Public Works department to examine its internal framework and develop metrics to measure effectiveness.

CHAPTER IV – Presents an analysis of determining value for non-tangible items, in this case; services rendered to the stakeholders at Naval Postgraduate School by the Public Works department. This will provide the reader with an appreciation of the difficulty in assessing value of a service that is received. This chapter gives sufficient background to the framework of consideration used to determine a value basis for intangible items.

CHAPTER V – Presents the background of cost-benefit analysis and how it relates to the Federal government and the Department of Defense. This chapter presents a brief history of how cost benefit analysis became an important tool to support the budgetary decision-making process. Further, it discusses the elements associated with execution of this method of analysis. Readers with a strong background in economics and cost-benefit analysis might find the discussion useful as a refresher; however they may choose to skip this chapter. Other readers unfamiliar with the process may desire to skim this section and return for a more in-depth consideration of the topic.

CHAPTER VI - Discusses Performance Management Controls and measures. Proven strategies and methods are identified from city planners and military bases throughout the country. This will provide the reader with a step by step method to analyze an organization and measure its effectiveness. Additionally, recommendations are provided to assist in reporting challenges and achievements to the various stakeholders.

CHAPTER VII - Focuses on data gathering techniques. It discusses the intricacies of surveying stakeholders, and topics that should be considered to gain effective data to base decisions. This will provide those uniformed in the process of how to conduct a survey the basic steps to maximize efforts in gathering desired data.

CHAPTER VIII – Presents the survey used for determining stakeholder assessments of provided services. An analysis of the results is included, explained, and then used to determine weighted averages for developing priorities for funding decreases.

CHAPTER IX – Presents the conclusions, recommendations, and areas for follow-on research based on the findings of our project.

D. METHODOLOGY

The objective of this project is to apply proven management principles and techniques to the problem of decreasing funding levels available to military bases. This project was not designed to highlight faults, but was an opportunity for a group of students to apply their education to a real problem. We hope, that through this project, we will have helped the Public Works department make a difficult decision in determining funding levels for the upcoming year.

This project used research which covered books, papers, military instructions, and internet articles. Best business practices from selected military bases and cities across the country were examined for applicability. Numerous lessons learned articles were reviewed from the International City/County Management Association (ICMA). The ICMA is an organization that conducts training, consultation, and organizes conferences for city managers throughout the world to share tools, techniques, and success stories to improve their ability to conduct municipality management.

The research team also conducted phone interviews with Naval Region Southwest, and attended planning meetings with the Public Works department at the Naval Postgraduate School, Monterey.

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II. STAKEHOLDER IDENTIFICATION AND ANALYSIS

A. INTRODUCTION

It matters not what type of organization you are a part of, when change is pending, it matters more whether you know who the “players” are and the rules they have set. In the realm of injecting change into a status-quo type situation, leadership must be keenly aware of what matters most and/or the degree of things that matter. Much like the Yin and Yang concept of a whole entity comprised of two symbiotic and equal parts, organizational change is made up of similar, albeit metaphorical, components, there must be an end-state goal/strategy (Yang) and a plan to attain it (Yin). They must motivate the behavioral change they seek to attain the planned end-state. They must highlight and appropriately correct any missteps in the process, without shifting focus from the overall objective for change.

To accomplish a single success on the road to overall change in the organization, leadership must identify who is in the game and who has a valid “stake” in the outcome, regardless of what direction the change takes. We realize that some individuals or organizations may think or perceive that they have a valid stake in the project even if they do not. This must be taken into consideration by designated leadership when assessing stakeholder validity. By identifying those individuals or entities who will be affected by any organizational change, leadership will be able to better gauge who might be a positive part of the change process, and perhaps more importantly, who might work to derail the process. It will also help focus any persuasive or marketing efforts that leadership is willing to invest in to attain the desired goal.

Since it is critical to know who will be impacted by any organizational change, it should be equally important to properly identify those affected individuals, and analyze what, if any, impact they may have on the desired change movement. Once identified, stakeholder strength to process or block change must be weighted to provide leadership avenues of energy/resource focus.

B. THEORY AND PRACTICE OF STAKEHOLDER ANALYSIS

The origins of Stakeholder Analysis can be traced back to the history of business and managerial science. This is reflected in the term "stakeholder" itself, apparently first recorded in 1708, to mean a bet or a deposit. A "stakeholder" now means "anyone significantly affecting or affected by someone else's decision-making activity."¹

Economic theory centered on notions of stakeholder relations goes back to the beginnings of industrialism and is embedded in ideals of 19th century cooperative movement and mutuality. Stakeholder theory reappears in business and management discussions of the 1930s. The approach was designed then and continues to be used nowadays by firms and organizations to factor in stakeholder interests in order to enhance the enterprise's relationship with society and secure better prospects of financial success. With the help of SA, firm decisions can profit from views that go beyond the narrow interests of stockholders and shareholders investing in a business.

The concept of stakeholder participation and consequently of stakeholder analysis as a first step was adopted by the public sector in the 1980's and 1990's. It has been widely accepted that the implementation of new laws, governmental initiatives and projects depend on the active support of the affected people, a process which is also described by the term "ownership". Ownership of processes means that stakeholders see these as part of or supplement to their own livelihood strategy. Change management theory has established that many well-conceived public initiatives fail because of lack of ownership and consequent widespread resistance of stakeholders.

Stakeholders can only speak for themselves. The entire notion of clearly defined stakeholder groups is a model which helps to reduce complexity for planning. People belong to many different groups (economic, social, ethnic, religious, age, etc.), and the individual mix of interests and economic objectives can never be exactly the same between two persons. However, stakeholder analysis assumes that there are common denominators of people belonging to the same stakeholder group.

A stakeholder analysis made without the participation of the actual stakeholders is usually the first step. However, elected or self-declared representatives can never entirely refrain from their own perception of reality. Therefore, each statement that is made on behalf of other

¹ Chevalier, Jacques M., The Change Management Toolbook, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

stakeholders is no more than an assumption which yet has to be proven. Only the stakeholders themselves, however, can prove the assumption to be true.

Since stakeholder identification is a consequential matter, analyses done without participation are likely to reflect the interests and agenda of the agency directing the exercise in social assessment. SA should be an iterative, action-oriented exercise in social analysis. If not revised during the project management cycle, an SA matrix may become obsolete; i.e., stakeholders and their interests and views may evolve, new actors may appear on the scene, or central issues and stakes may shift over time. The notion that SA is a one-shot, quick-and-dirty exercise constitutes a disservice to the programme as a whole.²

C. SOME DEFINITIONS³

Organizational Stakeholders are people or entities who have an interest, claim, or stake in an organization, in what it does, and in how well it performs. Stakeholders are often divided into stratified impact groups, such as primary, secondary and tertiary.

Some “internal” stakeholders and their desires might include:

- Shareholders (also viewable as “external”): Money and capital dividends and stock appreciation.
- Managers: Skills and expertise salaries, bonuses, status, and power.
- Line Employees: Skills and expertise wages, bonuses, stable employment, and promotion.

Some “outside” stakeholders and their desires might include:

- Customers: Quality, price and revenue from purchases of goods and services.
- Suppliers: High-quality inputs, fair compensation.
- Government: Rules governing good business practice for fair and free competition.
- Unions: Free and fair collective bargaining, job protection and an equitable share of inducements.

² Allen, Will; Kilvington, Margaret, Stakeholder Analysis, November 2001, <http://www.landcareresearch.co.nz/sal/stakeholder.asp>, (Accessed <June 25, 2005>).

³ Chevalier, Jacques M., The Change Management Toolkit, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

- Community: Social and economic infrastructure, revenue, taxes, and guaranteed employment.
- Taxpayers: Customer loyalty and reputation national pride.

Any skills, knowledge, and/or expertise that an organization requires of their employees or members during task performance are called a “Contribution.” “Inducements” to accomplish planned change are typically rewards such as money, power, and organizational status motivating.

Organizational Effectiveness is the balance between satisfying the stakeholders’ goals and interests, while meeting the organization’s required objectives. Despite many nay-sayers, this balance is achievable through careful application of time proven processes. There is often discord on the road of change as stakeholder goals often conflict, and stakeholder groups bargain over appropriate the balance of inducements to contributions. In the vein of ‘no man is an island,’ organizations are often regarded as alliances between groups of stakeholders, who understand the concept that the organization will remain viable as long as they contribute.

D. COMPETING GOALS

As is often the case, goals clash and thus the people behind those goals must face each other to arbitrate an acceptable solution. In capitalistic countries shareholder wealth has first priority, in terms of maximizing the organization’s return on investment. Ownership and control of organizations are frequently separated. For example, the shareholders may “own” a firm but, in practice, the manager’s control over organizational resources gives him or her “real” control. To this end, the goals of shareholders and managers may compete or be misaligned, causing a breakdown in the organizational change that is being pursued. Even without competing interests, selecting the right or appropriate goals, and the methodologies to achieve them, is a tedious task.

E. ALLOCATING REWARDS

This is an important component of organizational effectiveness, and thus critical to the stakeholder identification and analysis process. If leadership improperly allocates rewards, based on an incorrectly computed share ratio basis or some other miscalculation, the motivation for stakeholders to attain the desired goal could be compromised. Although it is often difficult to determine how to reward stakeholders based on

performance measures, it must be done, and it must be done by senior leadership in order for it to carry sufficient weight. Leadership must also take ownership for the compensation/reward decisions so there becomes a framework to which stakeholders can pin objections.

F. STAKEHOLDER ANALYSIS

We have discussed in more general terms what a stakeholder is, some of the forms they take, and some of the challenges faced by leadership in trying to implement organizational change with stakeholder involvement. This brings us to the doorstep of what is defined as the process of stakeholder analysis.

Stakeholder analysis, in broadly defined terms, is the identification of a project's key stakeholders, an assessment of their interests in the project's outcome, and the ways in which those interests affect a project's risk and viability. Stakeholder analysis contributes to project design by identifying the goals and roles of the different involved groups, and by helping formulate appropriate manners of engagement with these groups.

As previously highlighted, stakeholders are persons, groups, institutions, or entities with interests in a policy, program or project. Primary stakeholders are immediate communities of interest. Secondary stakeholders are the intermediaries in the process, and may include government agencies and/or other institutional bodies. Often, these groups do not think of themselves as stakeholders, because they feel they own the process. A rule of thumb for ensuring that "key" stakeholders have been included in the process is to question whose support or lack of it might significantly influence the success of the project or organization. This is a fitting test for expert and activist groups too, both of whom commonly claim to speak on behalf of a wider representation than may be the case, and whose capacity to articulate their concerns might easily cause other groups to be overlooked.

In a stakeholder analysis we look squarely at the stakeholder, and the relationship of that stakeholder to the organization, goals, process, etc. Different types of relationships may need different kinds of processes, some requiring more input to maintain their viability than others. Stakeholders can similarly be quite specific. An example of this

being individuals or geographically identifiable groups of people. Others are more 'amorphous', and less readily identifiable, and we have to think more laterally about how we are going to establish and maintain a working relationship with them.

G. WHY SHOULD WE CONDUCT A STAKEHOLDER ANALYSIS?

This is a valid question, particularly in the current setting of scarce resources and little time for pursuits that may be perceived as non-productive. We conduct them because the desired organizational end-state is worth the minimal managerial input required to identify and analyze the stakeholders. A stakeholder analysis is just one of the many steps in building the relationships needed for the success of a mutually involved project or policy. It provides the launching point, by establishing which groups to work with, which among them have “standing,” or authority weight, and setting up a plan so this can be achieved. The stakeholder analysis also helps project or plan initiators to assess the social environment in which they will operate. In particular a stakeholder analysis can be used to:

- Identify and define key stakeholder characteristics.
- Draw out the stakeholders’ interests in relation to the problems that the project is seeking to address (at the identification stage) or the purpose of the project (once it has started).
- Identify conflicts of interests that effect stakeholders, aiding in conflict management of these relationships during the course of the project.
- Help to identify stakeholder relationships that may enable "coalitions" of project buy-in and cooperation.
- Help evaluate the extent and capacity of different stakeholders and stakeholder groups to participate.
- Assess the appropriate type and level of participation by different stakeholders, at varying stages of the project cycle.

H. CONDUCTING A STAKEHOLDER ANALYSIS

Having a clearer understanding of what a stakeholder analysis is, and what the benefits of conducting one are, we will now discuss the methodology behind conducting one. There are three major steps, each with many minor sub-steps in a complete stakeholder analysis. Noting that this analysis is as much an artful endeavor as it is a

scientific undertaking, sticking to any single framework may prove “limiting” to those conducting it. What follows is a generic methodology, from start to finish, for completing a stakeholder analysis. This approach follows the following three steps:

- Identifying major stakeholders and stakeholder groups.
- Determining stakeholder interests, authority and influence.
- Setting up strategies for involvement.

I. IDENTIFYING MAJOR STAKEHOLDERS AND STAKEHOLDER GROUPS

Careful attention must be paid to ensure significant stakeholders are included. This is a critical step in the analysis process. Omitting a significant stakeholder can lead to translational problems. To begin, select a small group of eight or less people. With this team, identify and list all stakeholders. Stakeholders can be individuals, groups, communities, organizations, etc. Your team must also work to break stakeholder groups into smaller units (e.g. men and women, ethnic groups, locality, organizational departments, etc.). This further sub-division will often assist in identifying important groups who may otherwise be overlooked.

Stakeholder analysis is geared to enhance stakeholder involvement in the iterative change processes. In order to accomplish this, and prior to their actual involvement in decision-making activities, the stakeholders must be identified. Thus, stakeholders do not usually participate in their own selection. It can be argued that stakeholder identification has consequences. Therefore, analyses are likely to reflect the interests and agenda of the agency directing the exercise. This can be addressed later in the process by including more stakeholders as they or their interests come to light.

J. DETERMINING STAKEHOLDER INTERESTS, AUTHORITY, INFLUENCE, AND IMPORTANCE

To accomplish this step, we must draw out key interests for each stakeholder or stakeholder group on the initial list. Key questions might include, but should not be limited to:

- What are the likely benefits for the stakeholders?
- What are the expectations for the project (or change) from the stakeholder?

- What other interests does the stakeholder have that may conflict with the project?
- What might the stakeholder think of other stakeholders on the list?
- What resources are the stakeholders likely to commit (or avoid committing) to the project?
- What level of effort might the stakeholder exert to attain project success?

Next, assess the authority, influence and importance of each stakeholder on the project. Authority (influence) refers to the “powerful” a stakeholder holds. Importance addresses the stakeholders whose needs, interests and problems coincide with the goals of the project. If these “important” stakeholders are not involved or enabled, then the project cannot be called a “success” and may, in fact, be doomed to failure.

K. SETTING UP STRATEGIES FOR INVOLVEMENT

This is where your analysis goes from theory into action. You must plan strategies for approaching and involving each person or stakeholder group. It will depend on the results of the previous analysis for how you should proceed. The involvement of each stakeholder will depend on the level of participation they are allowed to have in the process. There is no need to force reluctant stakeholders to participate, as this is counterproductive. Their inclusion simply lends scope to the analysis and their exclusion allows for explanation of their interests not being adequately represented. Stakeholders may change their level of involvement as the process continues, injecting themselves wholeheartedly after they become comfortable with the process. Thus, partnerships should be flexible and designed to grow without detriment to the on-going process. Where the stakeholder is a group rather than an individual, you may need to decide whether all in the group participate or only a group representative should be allowed to speak on behalf of the group.

L. NAVAL POSTGRADUATE SCHOOL (NPS) STAKEHOLDERS

We have provided a general background on stakeholder analysis and outlined some of the elements to consider when conducting a stakeholder analysis. In the following paragraphs, we will illustrate what we have gathered from NPS, in the form of a stakeholder analysis, to lend credibility to the ultimate budget cutting decisions that are

inevitable for most institution. Stakeholder analysis will guide the hands of decision makers so they can make ‘stakeholder informed’ budget reductions with “surgical” precision.

M. STEP ONE: IDENTIFYING MAJOR STAKEHOLDERS AND STAKEHOLDER GROUPS AT NPS

As discussed previously, NPS has been directed to cut 25 percent from the Services Contracts they currently manage. These contracts generically encompass Grounds Maintenance and Landscaping, Trash/Refuse Collection, Pest Control, and Janitorial/Custodial Services. What follows is a theoretical Stakeholder Analysis for NPS as they attempt to assess the best methodology for making the required budget cuts.

1. Primary Stakeholders

Primary Stakeholders can be identified by asking the following questions:

- Who has approval authority or who has the ability to provide the financial support NPS needs to reach its goal?
- Who is directly affected by my plan or activity?

Examples of Primary Stakeholders for NPS may include:

- DoD
- NPS Leadership
- Commander, Naval Region Southwest (COMNAVREGSW)
- NPS Public Works Department
- Services Contractors
- Facilities Users
- Students
- Faculty/Staff

2. Secondary Stakeholders

Secondary Stakeholders can be identified by asking: Who is indirectly affected by our plans?

Examples of Secondary Stakeholders for NPS may include:

- Local business
- Foreign Participatory Governments and Militaries with Students at NPS
- Other NPS Tenant Commands and Organizations

- Local Residents who view NPS
- Visiting Temporary Assigned Duty (TAD) and Conference Personnel
- Service Contractor Employee Families
- California State Unemployment Insurance Agency

3. Tertiary Stakeholders

Tertiary Stakeholders can be identified by asking: Who is not involved or affected, but can influence opinions either for or against changes?

Examples of Tertiary Stakeholders for NPS may include:

- Local opinion leaders (church, business or trade union leaders, teachers, local celebrities)
- Local media
- Universities and Research Institutes
- Labor Unions
- Environmental Concern Organizations

Using the above process, we believe the major stakeholders in service contract budget cuts at NPS can be inserted into the matrix in Table 1. In some cases there may only be a small amount of information from secondary sources, in others there may be more information than can be easily summarized in the matrix. It is unlikely that all of the information will be currently available. This does not pose a problem as it will serve to highlight the important gaps in our information. As more data is gathered and more stakeholder groups participate in the process, the matrix will become larger and more complex. The groups currently listed are only examples and should be added to or deleted as appropriate.

Additionally, stakeholder involvement and participation takes on many forms and magnitudes. Table 2 highlights some of the different methods for analysis which are available for use. They are listed in order of stakeholder involvement, with the most participatory first and the least participative last. Ideally, the methods which best fit the project situation, addressing available time and resources, should be selected.

Group	Key Representatives	Available	Access	Priorities	Benefits	Authority	Importance	Relative Influence
Local Communities:								
Current Contract Employees								
Labor Unions								
Landscapers								
Gardeners								
Janitorial Workers								
Pest Control Specialists								
Refuse Collectors								
Government/Department of Defense (DoD):								
Big Navy								
COMNAVREGSW								
Local Military Leadership								
NPS Faculty (Professors)								
NPS Staff (Civilian/Military)								
NPS Public Works								
Coast Guard Station Monterey								
NPS Security								
NPS NEX/Gas Station								
Presidio of Monterey								
Ft. Ord Complex								
NPS Students								
Monterey City Council								
Monterey City Planners								
District Congressional Reps								
Other Base Employees								
Monterey Chamber of Commerce								
Businesses:								
Tourists/TAD Personnel								
Conference Personnel								
Local Businesses								
Water								
Electricity								
Cable/Phone/Gas								
Religious Groups:								
Protestant								
Non-Protestant								
Muslim								
Other								
Education Institutions:								
Schools (public K-12)								
Universities (Local and Cal System)								
Academic/research institutions								
Other National Pol/Mil:								
Civilian NPS Sponsors								
Military NPS Sponsors								
Donors:								
Local Docents								
National								
International								

Table 1. NPS Stakeholder Analysis Matrix⁴ (Adapted)

⁴ <CHINABIODIVERSITY> <Website>
<http://www.chinabiodiversity.com/shengwudyx2/training/px-6en.htm> (Accessed <June 27, 2005>).

Method	Notes
Direct Stakeholder Involvement in Planning Most Participative Method	The best way to ensure that the interests of stakeholders are incorporated into the management of the protected area is for them to be directly involved in the planning process (e.g. participate in planning workshops). Stakeholder identification will help determine who the most important groups to be involved are and who should represent them.
Consultation	Involves detailed discussions with individuals and small groups, perhaps in an informal way. Information consultation can be fed into the stakeholder analysis. This is the best way of obtaining direct information from local communities.
Information from Government/Military Staff and Partner Organizations	They should have a wealth of knowledge about the school (NPS) and the groups which interact with it. This is an easy way to provide the necessary information, but it is important that this is supported by the different groups having an opportunity to add their own information and opinions using the methods below.
Structured Interviews	Very formal. Potentially viewed as threatening to certain stakeholders. Can be combative if handled improperly. There is little to no anonymity to stakeholder contributions given in this manner.
Semi-Structured Interviews	This is more formal than the consultation process. During the course of the discussion, the interviewer will ensure that certain key points are covered. This informal context often allows opinions and information to be shared which is not elicited with a questionnaire.
Questionnaires	Questionnaires are good for providing quantitative formal data, and often help to cover many different groups in a standard way. They are more efficient in terms of time to acquire large data sets.
Information from Secondary and Indirect Sources Least Participative Method	Where it is not possible to obtain information by the above methods, it may be necessary to use other sources of information, such as reports, government information, interviews with researchers, etc. This is the best way to obtain information that provides the context - population, average incomes, economic data, etc.

Table 2. Stakeholder Analysis Methods⁵ (Adapted)

N. STEP TWO: DETERMINING NPS STAKEHOLDER INTERESTS, AUTHORITY AND INFLUENCE

This is basically an assessment of each stakeholders' importance to the project success and their relative power/influence on the project outcome, based on their inputs.

Interests of all of stakeholders may be difficult to define, especially if they are 'hidden,' or contrarian stated aims of the organizations or groups involved. A rule of thumb is to relate each stakeholder to either the problems which the project is seeking to address (if at an early stage of the project), or the established objectives of the project (if the project is already under way). Interests may be drawn out by asking:

⁵ <CHINABIODIVERSITY> <Website>
<<http://www.chinabiodiversity.com/shengwudyx2/training/px-6en.htm>> (Accessed <June 27, 2005>).

- What are the stakeholders' expectations of the project?
- What benefits are there likely to be for the stakeholder?
- What resources will the stakeholder wish to commit (or avoid committing) to the project?
- What other interests does the stakeholder have which may conflict with the project?
- How does the stakeholder regard others in the list?

This is a difficult task for NPS and would require a Thesis unto itself for faithful coverage of all interests, authority and influence for stakeholders involved in the services contract budget cuts. For the purposes of our illustration, specific to NPS, we will cover the four major groups we identify as critical to the success of the project. This process can best be accomplished in a Table/Matrix format (Table 3). Table 3 provides the spectrum of views, who is involved, and what power/influence they wield in the process at NPS.

Group	Interests	Authority	Influence
Staff (NPS Military Leadership)	-Wants to meet 25% cut. -Wants to maintain level of service and campus appearance. -Possibly tap student labor pool. -Desires stricter contract control.	-Legitimate and complete for the cuts. Answer to CNRSW.	-Complete.
Students	-Want to be left alone to study. -Want to be heard (opinions). -Will generally participate but feel unheard and/or disregarded.	-None, formally.	-None, formally. -Contribute via Survey, Suggestion Box and Student Council.
Faculty (Professors and Lecturers)	-Want to be left to teach and publish. -Do not want to empty their own trash or clean their own offices/whiteboards.	-Some, via Department Chairs and Deans.	-Unify to defeat agenda requiring their compliance.
NPS Public Works	-Bound to support NPS Staff in budget cut identification and execution. -Have resources to identify cuts (?) -Not aligned like other Higher Education Institutions within Navy/DoD. Funded like Op Bases.	-Some, via information they pass to Staff.	-Significant, they possess the resources and expertise to identify the cuts.

Table 3. NPS Stakeholder Interests, Authority and Influence Matrix⁶ (Adapted)

⁶ Chevalier, Jacques M., The Change Management Toolbook, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

Table 4 provides two additional analysis tools for aiding in stakeholder assessment: The Influence vs. Importance Matrix and the Power, Legitimacy and Urgency Model (adapted by Jacques M. Chevalier).

Stakeholder power / potential	High Stake / Importance	Low Stake/ Importance
High Influence / Power	Most critical stakeholder group: collaborate with	Useful for decision and opinion formulation, brokering: mitigate impacts, defend against
Low Influence / Power	Important stakeholder group, in need of empowerment: involve, build capacity and secure interests	Least priority stakeholder group: monitor or ignore

Table 4. Influence Vs. Importance Matrix⁷ (Adapted)

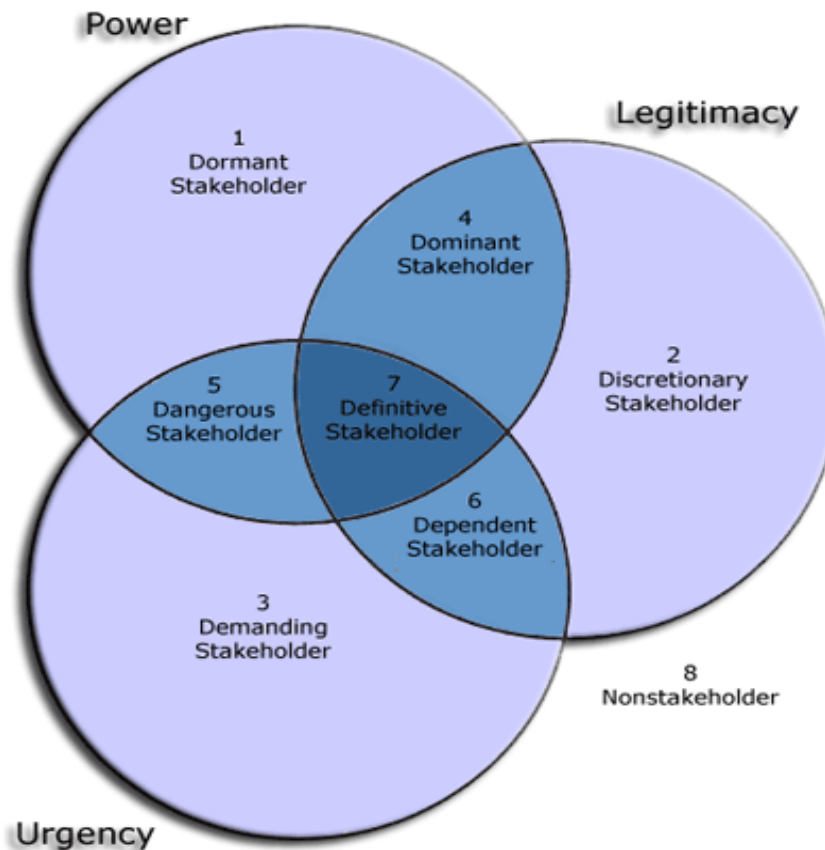


Figure 1. Power, Legitimacy and Urgency Model.⁸

⁷ Chevalier, Jacques M., The Change Management Toolkit, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

Chevalier states that:

While *legitimacy* (=normative appropriateness) is an important variable, two other factors must be considered when mapping out stakeholder class relationships. One factor consists in *power* defined as the ability to influence the actions of other stakeholders and to bring out the desired outcomes. This is done through the use of coercive-physical, material-financial and normative-symbolic resources at one's disposal. The other factor is that of *urgency* or attention-getting capacity. This is the ability to impress the critical and pressing character of one's claims or interests, goals that are time-sensitive and will be costly if delayed. These three "other-directed" attributes (legitimacy, power, urgency) are highly variable; they are socially constructed; and they can be possessed with or without consciousness.⁹

Consequently, there are eight different stakeholder groups:

- Dormant stakeholders (Power, no legitimacy and no urgency)
- Discretionary stakeholders (Legitimacy, but no power and no urgency)
- Demanding stakeholders (Urgency, but no legitimacy and no power)
- Dominant stakeholders (Power and legitimacy, but no urgency)
- Dangerous stakeholders (Power and urgency, but no legitimacy)
- Dependent stakeholders (Legitimacy and urgency, but no power)
- Definite stakeholders (Power, legitimacy and urgency)
- Non-stakeholders (No power, no legitimacy and no urgency)

Marketing has to address demanding and dangerous stakeholders, and try to win dominant, dependent and definite stakeholders.

For public participation, the groups a project needs to cooperate are the dominant and definitive stakeholders; their ownership of the activities has to be won. The capacity of discretionary and of dependent stakeholders to participate needs to be built up, and any

⁸ Chevalier, Jacques M., The Change Management Toolbook, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

⁹ Chevalier, Jacques M., The Change Management Toolbook, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

program for participation needs to monitor activities of demanding and "dangerous" stakeholders; their impact on project results needs to be mitigated. Dormant stakeholders need to be brought on board.¹⁰

Figure 1 is a diagram depicting these relationships.

O. STEP THREE: SETTING UP STRATEGIES FOR INVOLVEMENT

This step involves identifying risks and assumptions which will affect project design, stakeholder participation and project success. For NPS, this essentially runs the gamut from assuming Tenured Professors won't mind emptying their own trash cans and vacuuming their own offices to Service Contract providers such as Plan (pseudonym) Janitorial will continue their contract next year if NPS cuts their use of the contractor by a specific percentage.

Some examples of the risks and assumptions relating to the NPS reduction of service contracts may include:

- The obvious risks to cutting pest control services include rodent and/or insect infestation, food service shutdown (State/City Health Inspector involvement), campus health threat due to disease carrying/transmitting pests.
- For Trash/Refuse collection cuts, similar arguments hold as for pest control. Garbage that sits around or is taken away less often is subject to an increase in rodent and/or insect activity. Additionally, for a Navy "flagship" institution of higher education to have standing trash, in large quantities around campus, sets a terrible example.
- Grounds Maintenance and Landscaping risks include a deterioration of aesthetics from both campus dwellers and passers-by. In addition to looking shoddy, there is an inherent risk in leaving grass long and vegetation in disarray. Rodent populations may increase, as well as the injury hazards posed to pedestrians and joggers by hedge/bush overgrowth.
- Risks to custodial/janitorial cuts are typically health and comfort related. Students and faculty may be required to empty classroom and office trashcans, as well as wipe down classroom chalk and whiteboards. This appears to be a "hot button" issue with both students and faculty but 340 students voiced their dismay with this potential plan versus 22 faculty members.

¹⁰ Chevalier, Jacques M., The Change Management Toolbook, Theory and Practice of Stakeholder Analysis, <http://www.change-management-toolbook.com/tools/SA.html>, (Accessed <June 24, 2005>).

P. CONCLUSION

Stakeholder involvement is critical to the success of any project. Conscious efforts must be made to afford ample and repeated opportunity for stakeholder input and involvement.

Staff and Faculty have a significant say in what happens at NPS. We noted that of the 400+ survey respondents, less than 30 staff and 30 faculty members responded. From a statistical standpoint, this is not enough data to extrapolate a reasonable data set. The survey offered a very specific and viable method of stakeholder input, yet was largely ignored by two groups who wield significant power and influence at NPS.

The NPS Student Council solicited inputs from students regarding proposed budget cuts at NPS. These inputs were considered, but largely ignored due to their relevance to other fund areas, outside the scope of services contracts.

In our opinion, it is critical to take stakeholder input into consideration in the budget cutting process. Specific conclusions and suggestion will be addressed in a later chapter.

Q. SUMMARY

We have discussed the history, definitions, reasoning, and methodology of conducting a stakeholder analysis. A sample template was offered for consumption as well as an actual proposed template for NPS use regarding a 25 percent budget cut from services contracts under Base Operating Support (BOS) funds.

There are many models available for use in determining the specific impact certain stakeholders have on the process and outcome. The key is to pick one and proceed. It is easy to become mired in the intricacies of each stakeholder's desires and interests instead of getting the players identified, classified and involved. Although it is impossible to include everyone, every effort should be made to identify the critical stakeholders and solicit their involvement early.

In an ideal situation, the stakeholder input is factored in the budget cutting decisions at NPS. As stakeholders believe they were heard and a genuine effort was made

to translate their input into considerations for specific cuts, they will be more likely to “buy-in” to the final decisions made. If they feel largely ignored, there will be little energy exerted on their part to help the new plan flourish.

III. BASE EFFICIENCY MEASUREMENT

A. INTRODUCTION

Base efficiency measurement is a critical component in determining how to spend taxpayer dollars at military facilities. It is one of many methods that managers can use to determine how to best allocate and use their limited resources. Through our research, it is apparent that efficiency measurement is conducted differently between the various Navy Regions, and in some cases, differently between installations within regions. The variance in how efficiency is measured could cost bases even more of their shrinking budgets in the form of “penalties” or further reductions. This would be the case where a base either didn’t spend all of their money due to poor planning or the base spent more than allocated, a result of poor budgeting. The cognizant region would ensure that neither of these missteps occurred again by stricter controls. In addition to the standardization across facilities and regions in how efficiency is measured, a methodological ‘fine-tuning’ must be implemented to further squeeze efficiency out of every dollar spent. This fine tuning is accomplished through continuous user feedback in order to correct any efficiency measurement process deficiencies. The increased stratification of both Service Level, or what intensity of service is being provided, and Capability Level, or how the service performed translates to mission achievement/contribution, can aid in helping connect the impact of budget cuts to mission completion/contribution. The manner in which facilities convert tax dollars into mission contribution must also be addressed. Our study does this for facility contracts by highlighting capabilities levels (CL) and how they can be used to measure efficiency.

There are several different types and variants of based support facilities within each branch of service. Some of these facilities are uniquely military in their nature and mission, others are purely civilian in their infrastructure but support a service branch, while others are a blend of civilian and military. Within each variant of a facility there are further classifications as to the mission of the facility. An “operational” base such as Naval Air Station (NAS) Oceana is tacitly different from a “support” base like the Regional Training Center (RTC) at Great Lakes. This same divisional thought process

should be carried even further to classify institutions of higher education as a separate entity. The U.S. Navy has three institutions of higher education: The U.S. Naval Academy (USNA), the Naval Postgraduate School (NPS), and the Naval War College (NWC). The base support funding for the USNA is classified as a separate entity. The NPS and NWC are part of the regional base structure and subject to the same budgetary reductions to aid in funding the Global War on Terrorism (GWOT) as any operational base.

The United States Navy implemented a regional organization structure in the late 1990s. This consolidation of all Naval bases in the region significantly impacts funding to all bases. Regional command structure does not currently recognize the differences between the “types” of bases, as defined by mission. This becomes an issue when the inevitable budget cut becomes a reality because cuts that might be ‘easy’ for an operational base to absorb can be devastating for NPS. For instance, the Navy’s share of the budget shortfall for FY2005 is 25 billion dollars.¹¹ A percentage of the Navy’s budget reduction will come from the Navy Regions and have been directed downward from the region authority to the base level. For example, NPS’ share of this budget reduction is approximately \$540,000 or 25 percent of their base support budget. The budget reduction is to come from the Service Contract section of the NPS budget.

B. THE BERNIS MODEL, A CASE BUILT ON BUSINESS RULES

The Navy’s Mid-Atlantic Region (NAVREGMIDLANT) is home to many naval installations, including the Naval Amphibious Base (NAB) at Dam Neck, Virginia. NAB Dam Neck is an amphibious operations complex that not only facilitates amphibious ship support operations, but also houses the East coast SEAL Team operators. LCDR M. Berns developed a business rules model for NAB Dam Neck, an initial step for improving the process towards measuring efficiency for his base.¹²

A simple description of the modeling that occurs within LCDR Berns’ work is not possible. The process by which computations take place and how variables are

¹¹ Clark, Vernon, ADM/USN, CNO Guest Lecture Series, NPS, June 14, 2005.

¹² Berns, M., LCDR/USN, Real Property Services Requirements Generation Model Business Rules, March 12, 2003.

“weighted” is beyond the scope of this project. Our project will discuss what comprises the Berns Model and why we feel it has application at NPS and other installations in the Navy Region system if it is modified to fit the funding profile.

As with any mathematical equation or model, every “answer” that an equation produces comes from adjusting a specific set of variables, shaped by an underlying set of governing rules which limit the amount and degree to which the equation and variables can be altered to produce a result. This also means that assumptions must be made in order to achieve an outcome. Measuring the efficiency of a process or entity operates in much the same manner in that input variables are generated based on the Navy Region’s desired measurement points and adjustments are made to the formulary based on specific base circumstances.

The Navy, as are all the branches of the United States Military, is in the midst of a sweeping transformation. Much of the transformation centers on better use of tax dollars in recapitalizing the force and leveraging gains in technology to reduce personnel requirements. Performance and efficiency measurement are common practices used in business and industry. The Department of Defense (DoD) is incorporating performance models for base infrastructure support to use as benchmarks to enhance the efficiency of base operations. The Berns Model is one such effort to measure the efficiency of base infrastructure support.

The Berns Model addresses Refuse, Pest Control, Grounds Maintenance, Street Sweeping, Snow Removal, and Custodial as service areas. It uses Operations and Maintenance, Navy (O&MN) and Operations and Maintenance, Navy Reserve (O&MNR) dollars to fund these services.¹³ Each listed service was broken down into a “unit cost.” For example, the unit cost for refuse was determined by dividing the FY01 O&MN refuse obligations by the total square footage of type 2 buildings that are maintained with O&MN (referred to as source A) or O&MNR (referred to as source B)

¹³ Berns, M., LCDR/USN, Real Property Services Requirements Generation Model Business Rules, March 12, 2003.

funds.¹⁴ Unit Identification Code (UIC) and Special Activity (SA) entities are paired into a UIC/SA and are assigned to a financial UIC for bookkeeping purposes. The square footage of all fund source A or B type 2 facilities are totaled for each UIC/SA. Each financial UIC now had a total square footage of source A and B funded, type 2 buildings assigned to it and the refuse cost under that financial UIC became the total square footage multiplied by the unit cost. Similar processes yield total cost per financial UIC for Pest Control (total financial UIC square footage multiplied by a unit cost), Grounds Maintenance (divided into three service levels and unit cost is computed based on a hypothetical 100 acre parcel), Street Sweeping (total square yards of paved roads and parking areas multiplied by the unit cost which, in this case, was derived from U.S. city cost data), Snow Removal (based on historical costs over a specific period), and Custodial (based on a hypothetical 10,000 square foot building within specific service levels).¹⁵ A more in depth description is provided later in this chapter on parallels to application at NPS for some of the specific Berns Model categories.

We feel that the Berns Model is a valid tool to measure efficiency. The unit cost measurement serves as a benchmark for future comparisons. Costs rise annually based on contract renegotiation. However, the baseline unit cost numbers provide a metric or standard to determine variances in actual costs. The variances will indicate where the costs changes are occurring, i.e., labor, supplies, etc. We believe the Berns Model has applicability at NPS because it is an “operational base” according to the Commander, Navy Region Southwest (CNRSW). Funding profiles differ between installations like USNA and NPS since, as previously stated, the USNA is not part of the regional structure. This is a fundamental flaw within the regional system when it comes to a premier educational institution like NPS as it is an installation that has unique funding requirements and does not fit the traditional role of an operational base. This creates a mismatch between funding and requirements, for an institution that is considered prominent due to ongoing projects and its ties to world-wide academia.

¹⁴ Berns, M., LCDR/USN, Real Property Services Requirements Generation Model Business Rules, March 12, 2003.

¹⁵ Berns, M., LCDR/USN, Real Property Services Requirements Generation Model Business Rules, March 12, 2003.

Much like the Berns Model, the Naval Postgraduate School, under the service contract portion of its budget, supports contracts that fall within four main categories:

- Grounds Maintenance and Landscaping
- Pest Control (bug and rodent elimination, Goose Control, etc)
- Custodial (janitorial services)
- Trash/Refuse (dumpster collection)

Grounds maintenance and landscaping will be discussed in depth, using the Berns Model methodology for computing unit cost. The remaining three categories are commented on in less detail to facilitate brevity. This data provides a baseline from which efficiency comparisons are possible.

C. GROUNDS MAINTENANCE AND LANDSCAPING

The Naval Postgraduate School recognizes four main categories of required grounds maintenance and landscaping: Prestige, Improved, Semi-Improved, and Unimproved. Within these categories, computational analysis was conducted to generate a unit cost for maintaining and landscaping a typical acre of Prestige grounds, Improved grounds, Semi-Improved grounds, and Unimproved grounds. The actual cost per acre for NPS, within each of the category areas versus the specific services provided, is illustrated in Table 5.

	Prestige	Improved	Semi-Improved	Unimproved
Relative Cost	\$31.0K/acre (3.4)	\$14.4K/acre (25.3)	\$12.1K/acre (5.4)	\$3.9K/acre (17.1)
Mow	45 Freqs. Height 2 - 3"	35 Freqs. Height 2 - 4"	30 Freqs. Height 2 - 5"	20 Freqs. Height 2 - 6"
Trim	45 Freqs.	35 Freqs.	30 Freqs.	20 Freqs.
Edge	36 Freqs.	24 Freqs.	12 Freqs.	No.
Irrigation	120 Freqs. (3/wk)	80 Freqs (2/wk)	No.	No.
Broadleaf	2 Freqs	1 Freqs.	No.	No.
Dethatch	2 Acres Per Yr.	No.	No.	No.
Rodent Control	300 Hours /yr	200 Hours/yr	No.	No.
Debris Collecion	45Freqs.	35 Freqs.	30 Freqs.	20 Freqs.
Aerate Lawns	4 Freqs.	1 Freqs.	No.	No.
Fertilize Lawns	2 Freqs.	2 Freqs.	No.	No.
Overseed Lawns	8 Freqs.	1 Freqs.	No.	No.
Shrub Pruning	4 Freqs.	4 Freqs.	4 Freqs.	4 Freqs.
Shrub Fertilize	4 Freqs.	2 freqs.	No.	No.
Sweep Walks & Entrances	52 Freqs.	45 Freqs.	35 Freqs.	20 Freqs.
Storm Cleanup	6 Freqs.	6 Freqs.	6 Freqs.	No.
Empty Trash Cans	52 Freqs.	52 Freqs.	52 Freqs.	52 Freqs.
Plants, Planter Beds Care	24 Freqs.	24 Freqs.	4 Freqs.	No.
Ivy Control	10 Freqs.	8 Freqs.	4 Freqs.	4 Freqs.
Weed Shrubs	12 Freqs.	8 Freas.	4 Freqs.	4 Freqs.
Vegetation control	8 Freqs.	6 Freqs.	4 Freqs.	2 Freqs.
Minor Tree Maintenance	Yes, as needed	Yes, as needed	Yes, as needed	Yes, as needed
Maintain Storm System	Yes, as needed	Yes, as needed	Yes, as needed	Yes, as needed

Table 5. NPS Basic Cost Per Acre by Category.¹⁶

NPS differs from most military installations within the Navy in that the “base” is actually comprised of several sites around the Monterey Bay area. For example, the Grounds Maintenance and Landscaping Service Contract cover the NPS campus, the Child Development Center and Baseball Field at the La Mesa privatized housing complex, and the Fleet Numerical and Oceanography Center near the Monterey County Airport.

¹⁶ Suess, Matt, CDR/USN, NPS Public Works, Facilities Sub-Committee Meeting, May 05, 2005.

Using the Berns Model with relevant NPS data, and slightly modified to exclude fund source, yields the following costs per unit displayed in Table 6. These become significant benchmark numbers. These units cost can be used to check cost levels for specific grounds maintenance categories by outside financial authorities. They can also be used internally for preventing contract ‘cost creep.’ Additionally, the unit cost can be used to compare between category options. If, for instance, NPS wants to convert the 3.4 acres of Prestige grounds to Improved grounds, they can expect to pay 46.5 percent less per square foot. This is value added information in budget cutting decision making and NPS benefits from unit level cost computations.

	Prestige	Improved	Semi-Improved	Unimproved
Relative Cost/acre	\$31.0K/acre (3.4)	\$14.4K/acre (25.3)	\$12.1K/acre (5.4)	\$3.9K/acre (17.1)
Total Cost/square foot	\$0.71/sq ft	\$0.33/sq ft	\$0.28/sq ft	\$0.09/sq ft

Table 6. Cost per Square Foot, by Category

The data from Table 6 will be used by CNRSW to compare unit costs with other installations within their oversight. Adjustments need to be made for differences in labor and other variable costs for different areas within the region. Additionally, different service levels within each category will affect the cost per acre and thus the unit cost. For example, each category above is further sub-dividable into four service levels (SL). These SLs can be modified for the frequency in which certain services are performed and/or omitted altogether. A Prestige category with a SL 3 may only require 40 mowing and trimming sessions per year and four overseedings vice eight at SL 1. NPS does not currently utilize a SL structure. Since image is very important to NPS, installing a set of SL sub-divisions can allow for more ‘surgical’ budget reductions than simply changing all Prestige acreage to Improved or Semi-Improved.

None of the categories at NPS are SL sub-divided. As previously mentioned, adding such a structure will aid in smoothing budget cuts across service contract areas, without significant reductions in services provided.

D. UNIT COST ADJUSTMENT FACTORS

Unit costs must be adjusted for local variations in cost, based on area cost factors from the Internet Navy Facility Assets Data Store (iNFADS). This is where unit costs are

adjusted to reflect where a base is physically located. These area cost factors are designed to account for variation in construction costs. A significant flaw, when comparing budget cut decisions across regions (using iNFADS) is that the correlation to service cost fluctuations is not known, i.e. not being accounted for in the program.

E. SEASONAL ADJUSTMENT COST FACTORS

From the original Berns Model for NAB Dam Neck, Virginia, the grounds maintenance requirement for each financial UIC is the Improved, Semi-improved and Unimproved acreage total multiplied by the appropriate service level unit cost. Historical obligations are compared against the initial installation requirements. Regional patterns emerged in the differences between the historical obligations and theoretical requirements, which could reasonably be explained by differences in climate. Based on this analysis climate factors were developed. For example, Florida's seasonal adjustment factor is 1.5 while New London's is .65. These seasonal adjustment factors most certainly apply to NPS versus other CNSRW installations like NAB Coronado or Naval Air Station (NAS) North Island.

F. PEST CONTROL

The Berns Model uses square feet for computing unit cost for pest control. Ideally, this is for single story buildings, spread over a fairly large area (acreage). NPS is a relatively small base with a concentrated number of multi-story buildings. Most operational bases that NPS compares to are much larger, with a less concentrated building "footprint," in both placement and number of occupied floors. In the regional structure, most operational bases have a minimal number of "classrooms," mostly used for annual training requirements and meetings. NPS, however, has a large number of classrooms. For this reason, pest control costs are relatively high when compared against other operational bases in the Southwest region. A better comparison might be made using the USNA, since it is another Naval institution of higher education.

G. CUSTODIAL

The same arguments apply here as do for the Pest Control category. NPS, as an educational institution, has higher concentrations of personnel per square foot of usable building space. This translates to more wear and tear, and more required cleaning. Traditional models, including the Berns Model, only use 50 percent of classroom space in

their calculations, based on the assumption most classrooms are only occupied 50 percent of the time. This is an apparent flaw when considering the classroom utilization at a full time school. Significant increases in custodial costs are incurred because classrooms are used significantly longer during the day and subsequently become dirtier than the standard Navy Model suggests.

H. TRASH/REFUSE

As is the case with custodial services, personnel density also plays a role in the volume of trash produced. NPS is not an average facility in the traditional sense of a building containing just offices. Each building on campus has offices and classrooms, thereby increasing the population density per square foot of building space. Increased population densities equate to increased costs in trash collection due to increased trash output. NPS is expected to operate at a Southwest region generated cost per unit, based on a model not compatible with a school setting. Trash costs for individual installations vary widely due to differences in environmental regulation, disposal fees and distance to the nearest landfill.

I. STREET SWEEPING

Although this is not part of the official services contract responsibility, because it is conducted in-house, by Public Works employees, it bears mention because the equipment and maintenance costs are significant. The unit cost for Street Sweeping used was \$0.003/SY per occurrence. This unit cost was obtained from cost data from U.S. cities. Several cities have cost reports on the internet and this unit cost was fairly typical when compared nationally, based on the available data.

The square yards of paved roads and parking are totaled for each activity from iNFADS. Primary roads were estimated to be 50 percent of the total roads. As parking lot paving and repair increases at NPS, so will the cost for sweeping it. The area cost factor from iNFADS was also applied. NPS does not feel this category is not a cost driver for the service contract arena since it owns its own equipment and uses PWC employees for the street sweeping activity.

J. CAPABILITY LEVELS – FACILITIES SUPPORT SERVICES

1. Facility Support Services

Every base or activity requires services to occur within its boundaries. In years past, particularly for the Navy, “Sailor power” performed most of the services presently covered by service contracts. Services are contracted for and include standards or metrics by which contract performance is to be measured. Naval Postgraduate School PWC employs a contract monitoring specialist who conducts routine inspections to enforce the specific provisions of the contract.

Within the service contracts for each of the four primary areas covered in our project, each of the primary areas is further divided into capability levels (CL) that directly translate into how well the overall mission is supported. This measurement is accomplished by completed tasks meeting the minimum standards set forth in each capability level.

A complete set of CLs would need to be developed for each of the active service contracts that NPS currently employs. This approach would not only aid in assessing how well the contract is being executed but would also validate the value added to the mission of NPS. CL data could be compared with historical data to ascertain whether gains are being made in efficiency and contract execution in a process improvement environment. For example, two separate CL categories are listed below, one for Facility Management and one for Facility Services. The performance criteria in the following sections are provided for recommended guidelines to assist NPS and other activities in assessing the performance of their current service contracts.

2. Facility Management¹⁷

CLI: Meet or exceed the following standards –

Facility Investment Planning and Asset Management activities fully support and anticipate mission requirements throughout the life cycle of the facility. This Facility Management capability is described by the following performance criteria:

¹⁷ Ostrowski, Kinberly, Capability Levels – FY – 05 Facility Support Services, 2005.

- Have a Facility Development Program that fully supports and anticipates mission requirements. Fully developed DD Form 1391's are complete for 3 years of MILCON and Special projects. 95% of Basic Facilities Requirements (BFRs) are current.
- 90% of Facility Condition Assessment Inspections are complete, as required by MO-322. Designs are complete for 100% of next year's SRM Special Projects program, as well as 50% of the following year's program. Customers are routinely kept up to date on status of their work requests. At least 95% of projects are executed based on an established Maintenance Action Plan (MAP).
- Property Record Cards noted in iNFADS are 98% accurate. Space assignments are almost always made in accordance with an established Space Management plan. A Space Management plan ensures that organizations occupy the right space in the right place. Fully developed DD Form 1391's and designs are complete for 3 years of projects in the Footprint Reduction (Demolition) Program.

CL2: Meet or exceed the following standards –

Facility Investment Planning and Asset Management activities substantially support and anticipate mission requirements throughout the life cycle of the facility. This Facility Management capability is described by the following performance criteria:

- Have a Facility Development Program that substantially supports and anticipates mission requirements. Fully developed DD Form 1391's are complete for 2 years of MILCON and Special projects. 75% of BFRs are current.
- 80% of Facility Condition Assessment Inspections are complete, as required by MO-322. Designs are complete for 100% of next year's SRM Special Projects program, as well as 25% of the following year's program. Customers are routinely kept up to date on status of their work requests. At least 75% of projects are executed based on an established MAP.
- Property Record Cards noted in iNFADS are 95% accurate. Space assignments are generally made in accordance with an established Space Management plan.
- Fully developed DD Form 1391's and designs are complete for 2 years of projects in the Footprint Reduction (Demolition) Program.

CL3: Meet or exceed the following standards –

Facility Investment Planning and Asset Management activities marginally support and anticipate mission requirements throughout the life cycle of the facility. This Facility Management capability is described by the following performance criteria:

- Have a Facility Development Program that marginally supports mission requirements. Fully developed DD Form 1391's are complete for 1 year of MILCON and Special projects. 50% of BFRs are current.
- 70% of Facility Condition Assessment Inspections are complete, as required by MO-322. Designs are complete for 100% of next year's SRM Special Projects program. Customers are routinely kept up to date on status of their work requests. At least 50% of projects are executed based on an established MAP.
- Property Record Cards noted in iNFADS are 90% accurate. Space assignments are seldom made in accordance with an established Space Management plan.
- Fully developed DD Form 1391's and designs are complete for 1 year of projects in the Footprint Reduction (Demolition) Program.

CLA: Meet or exceed the following standards –

Facility Investment Planning and Asset Management activities do not adequately support and anticipate mission requirements throughout the life cycle of the facility. This Facility Management capability is described by the following performance criteria:

- Facility Development Program does not adequately support mission requirements. Fully developed DD Form 1391's are complete for less than 1 year of MILCON and Special projects. Less than 50% of BFRs are current.
- Less than 70% of Facility Condition Assessment Inspections are complete, as required by MO-322. Designs are complete for less than 100% of next year's SRM Special Projects program. Customers are seldom kept up to date on status of requests. Fewer than 50% of projects are executed from an established MAP.
- Property Record Cards noted in iNFADS are below 90% accurate. There is no established Space Management plan.
- There is no established Footprint Reduction Program.

3. Facility Services¹⁸

CLI: Meet or exceed the following standards –

- *Janitorial/Custodial:* All spaces receive services consistent with industry benchmarks for similar type spaces. Generally, all classrooms and spaces are cleaned daily except for operational or industrial activities. Floors are shampooed or re-waxed and windows are cleaned four times per year.

¹⁸ Ostrowski, Kinberly, Capability Levels – FY – 05 Facility Support Services, 2005.

- *Grounds/Landscaping Maintenance*: Vegetation height does not exceed 4" in improved areas. Undesired vegetation is controlled, litter is removed and edged appearance is maintained. Thatching, aerating, fertilizing, top dressing and over seeding are performed in prestige areas. Shrubs and hedges trimmed to maintain a neat appearance.
- *Refuse Collection/Recycling**: All dumpsters are emptied on an optimized schedule. Pickups are scheduled at the minimum number that will prevent dumpster overflow. Recycling performed to reduce solid waste volume.
- *Pest Control*: Perform all surveillance and treatment IAW DoD guidelines.
- *Street Sweeping*: Primary roads are swept every two weeks, secondary roads and parking lots are swept monthly.

CL2: Execute the mission at the below reduced standards –

- *Janitorial/Custodial*: Child Development Centers, classrooms, locker rooms, and restrooms are cleaned daily. Other spaces are cleaned and trash removed twice weekly vice daily. Floors are shampooed or re-waxed and windows are cleaned two times per year vice four times.
- *Grounds/Landscaping Maintenance*: Vegetation height does not exceed 6" in improved areas other than prestige areas, which remain 4". Grass cuttings will remove 2/3 of the blade height adversely affecting the health and longevity of the grass. Restoration costs ultimately result when turf re-establishment becomes necessary.
- *Refuse Collection/Recycling**: All dumpsters are emptied on an optimized schedule. Pickups are scheduled at the minimum number that will prevent dumpster overflow. Recycling performed to reduce solid waste volume.
- *Pest Control*: Perform all surveillance and treatment IAW DoD guidelines but delete weed control.
- *Street Sweeping*: Primary roads, secondary roads and parking lots are swept monthly.

CL3: Execute the mission at significantly reduced standards as outlined below –

- *Janitorial/Custodial*: Child Development Centers, classrooms, locker rooms, and restrooms are cleaned daily. Other spaces are cleaned and trash removed weekly vice daily. Floors are shampooed or re-waxed and windows are cleaned yearly vice four times yearly. Service life of flooring is degraded. Some MILPERS & CIVPERS effort required to maintain minimal cleanliness standards.
- *Grounds/Landscaping Maintenance*: Edging eliminated from non-prestige areas. Thatching, aerating, fertilizing, top dressing and over seeding are eliminated from prestige areas. Some MILPERS costs result from maintenance of critical areas. Base appearance significantly impacted.

- *Refuse Collection/Recycling**: All dumpsters are emptied on an optimized schedule. Pickups are scheduled at the minimum number that will prevent dumpster overflow. Recycling performed to reduce solid waste volume.
- *Pest Control*: Perform all surveillance and treatment IAW DoD guidelines but delete weed control, and turf and ornamental pest control.
- *Street Sweeping*: Primary roads are swept monthly, secondary roads and parking lots are swept every two months.

CLA: Mission requirements will not be met, based on outlined standards below –

- *Janitorial/Custodial*: Child Development Centers, classrooms, locker rooms, and restrooms are cleaned daily. Janitorial services are minimized or eliminated in other spaces. MILPERS & CIVPERS effort required for ‘must’ cleaning of workspaces.
- *Grounds/Landscaping Maintenance*: No services performed other than mowing. MILPERS effort required for maintenance of shrubs, hedges and plant beds. Base appearance degraded to unacceptable levels.
- *Refuse Collection/Recycling**: All dumpsters are emptied on an optimized schedule. Pickups are scheduled at the minimum number that will prevent dumpster overflow. Recycling performed to reduce solid waste volume.
- *Pest Control*: Perform no surveillance; provide pest control treatment based on occupant complaint.
- *Street Sweeping*: No street sweeping.

Note: Only one service level for Refuse Collection/Recycling. This is the minimum capability required to meet mission, environmental, health and safety requirements.

K. CONCLUSION

We have addressed base efficiency measurement as a means to determine whether tax dollars are being effectively spent. Different Navy Regions measure efficiency in different ways. It seems intuitive that standardization should be instituted for all regions when it comes to efficiency measurement, or at least a guidance model established.

The structure of service contracts become highly visible in time of budget reductions. Current service contracts at NPS are set up with a fixed set of requirements for a set cost. For budget reductions to be effectively accomplished, we believe there needs to be more stratification within the service contracts. This stratification is defined as service levels and capability levels. This change gives more options to service contract

managers at NPS and other bases as they make budget cuts incrementally, without severe service reductions. It is a win-win situation if service levels and capability levels are instituted at NPS and other bases, both from an efficiency measurement standpoint and from an incremental budget cutting point of view.

The Berns Model was discussed, highlighting how NAB Dam Neck, Virginia operates its services. This operational model has significant merit in our opinion and can be modified to suit specific needs at NPS and elsewhere.

The funding structure that supports operational bases and premier institutions of higher education within the Navy are different. Attempting to support a unique educational facility like NPS on dwindling Base Operating Support (BOS) funds is counterproductive. We recommend that NPS be added to the list of premier higher education institutions and be funded separately, apart from the Navy Region structure to preserve the level of service contract required for such a densely populated school.

L. RECOMMENDED AREAS FOR FUTURE RESEARCH

- Budget cuts in services contracts can be detrimental to NPS.
- Measuring NPS against operational bases as a unique type of installation, an institution of higher education, serving all of our United States branches of service, several US Federal Agencies, and 54 countries from around the world.
- Research classification of NPS in the same category as the United States Naval Academy at Annapolis and the Naval War College, apart from the standard “region” structure, calling them institutions of higher education vice operational bases.
- The conscious decision to leave NPS in the regionalized structure affords NPS little protection from BRAC and misaligns NPS with operational bases for budget cuts.
- Traditionally, efficiency is measured by how well bases align their costs against the regional estimates for what the costs should be. The region structure uses activity based costing (ABC) to determine what it should see for “bills” from its installations. When a bill comes in for more than the expected amount, based on specific unit measurement/costs, the region investigates the lapse in “efficiency”.

- The flaw in this system is that the data generated is not real time information. It is time late and tells what has already happened vice present an accurate prediction of what may lie ahead. It is useful, to some extent as a predictive tool, provided all variables remain relatively unchanged.

IV. METHODS TO ASSESS VALUES OF INTANGIBLE SERVICES

A. INTRODUCTION

Methods to evaluate services, such as that of a cost benefit analysis, have to be compared with the ability to assess a monetary value against intangibles. An evaluation framework for assessing the value of various services needs to be based on an assessment of the impact to the customer. Traditional techniques of monetization are described to follow, to include a presentation of an "integrated costing approach." Issues that may significantly affect costing base services and impacts are also discussed as are the advantages and disadvantages of monetization methods.

This section reviews the framework for the evaluation of transportation initiatives and the methods that have been traditionally employed. Of note, the Cost Benefit Analysis (CBA) is explained more fully in the next chapter, but needs to be included in this section as well.

B. TRADITIONAL APPROACHES FOR INCLUDING SERVICE COSTS IN PLANNING

1. Cost Benefit Analysis

The first group of approaches to incorporating service costs in planning is the method of a cost benefit analysis which attempts to monetize non-market criteria. Cost benefit analysis (CBA) may be used when the benefits are described under more than one criterion and are reasonably monetizable. Cost benefit methodology for appraisals of public services considers only the net use of these services. The investment must produce a net saving in the use of monetary resources, or a net gain in stakeholder utility, in order to be viable. To be economically efficient, the loss of benefits must be less than the money saved by terminating/altering the service.¹⁹

Cost benefit analysis is based on the concept of measuring the net impacts of services on the stakeholder, where possible, monetizing these impacts to determine the

¹⁹ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

maximum benefits to Military Bases as a whole. It is weighted by the consideration of the distribution of benefits among different stakeholders, and in this case is pertinent to the stakeholders of the Naval Postgraduate School, Monterey. In other words, it considers efficiency but not equity. Transfer payments from one party to another are not transfers of economic activity from one stakeholder to another, but are manifestations of equity rather than efficiency and so are not considered on the basis of a monetary determination.

In theory, cost benefit evaluations should count only the net benefits in excess of opportunities forgone due to the decision, assuming that services would be otherwise maintained if there were no fiscal constraints. The analogy for the environment is that the environmental impacts should be the difference between the service rendered in its entirety and the best alternative reconsideration of the service based on the value assessed in relative terms by the stakeholders. In reality, the alternative is more of a determination of the employment of fiscal resources to exercise that service based on the constraint of stakeholder value versus the fiscal benefit of a revision or termination of that service. So the impacts of this "alternative" are considered relative to the impacts that would take place for a base case of "business as usual," "do minimum" or "do nothing," which are in many respects speculation. Consequently, service evaluations assess the increments (negative or positive) in anticipated environmental impacts of a proposal compared with the "*do minimum*" base case.²⁰

Sometimes it is pointed out, particularly in connection with environmental consequences of a decision, that many of the *indirect* benefits are disregarded, and therefore the value determinations bias the analysis. Benefits of custodial services to a base include the provision of the following: jobs for local community, goodwill on the part of the stakeholders, a positive perception to the visitors, and a comfortable, sanitary, and pleasant environment to the resident stakeholders.²¹

²⁰ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

²¹ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

While base services do contribute to economical aspects of the base operation, many of these indirect benefits are not realized or considered in the appraisal of user benefits by the resident stakeholders. In addition, jobs created or sustained by the providing of base services can only be counted as creating employment if workers who fill these jobs were previously unemployed rather than employed elsewhere. The scope of the previous statement and the subject of jobs and employment levels to Government Service Employees and Full Time Equivalents (FTE) are important to mention considering the previous paragraph, but is beyond the scope of this study.

The standard CBA of base services provided compares the costs of the general maintenance activities with the stakeholders' benefits of any proposed reduction in these services, decreased aesthetical appearance of the base, decreased custodial activities, savings in operating costs, which are projected as much as possible over a future period. If the *present value* (the present equivalent of future values) of the difference between the benefit and the costs is positive relative to the overall level of the service provided, the decision is economically viable (the *net present value* is positive). In theory, CBA should include all costs and benefits, and should reduce all of them to monetary units. Doing both is extremely difficult if not impossible, but a relative determination of this value is possible considering the perceived user benefits that are determined through a compilation of data in the model of questions aimed at the various stakeholders that provide a relative value to services that are provided by a Military base. This means the analysis will be incomplete, but with consideration of the nature of the intangibility of services, this will at least provide the ability to make decisions that affect all stakeholders with consideration to the value that the various stakeholders have determined.²²

Attempts have been made to reduce all types of costs and benefits to a monetary unit, but many non-market and intangible impacts defy such inclusion. The use of unreasonable monetization methods would discredit the cost benefit appraisal in the eyes of decision makers and the stakeholders.

²² Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

2. Social Cost Benefit Analysis (SCBA)

Social Cost Benefit Analysis also attempts to reduce all types of costs and benefits to a monetary unit. In principle, SCBA is no different from CBA, but the distinction is made here to draw attention to unrealized capability of CBA to consider a wider range of social costs than is normally associated with the determination of levels of base service that meet the anticipation of the stakeholders for which those services are intended to satisfy. Labeling of SCBA is not an attempt to venture into yet another complex model to confuse the reader, but is important to emphasize that monetization of intangible services is difficult, but the social cost borne by the stakeholders needs to be considered, and therefore is yet another basis for determination of value.²³

It should be noted that although CBA uses monetized values, even those impacts that are attached to concrete monetary figures are not a perfect price, but merely a subjective determination based on the perception of the user. CBA frequently uses shadow prices that differ from market prices, in order to correct for various externalities and distortions. This implies that the analysis is judgmental in determining the "correct" price or "correct" relative value. No evaluation method, including CBA, can be free of some degree of subjective judgment; the best that can be done is to use accepted methods in a relatively consistent and transparent manner.²⁴

3. Multi-Attribute Utility (MAU) Models

One last method of comparisons that is more technical in nature, but can have some input to this decision process is the Multi-attribute utility (MAU) model. This technique employs mathematical tools for evaluating and comparing alternatives to assist in choosing among them. These models are designed to answer the question, "What is the best choice among the factors that affect the stakeholder?"²⁵

²³ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

²⁴ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

²⁵ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

MAU models are based on the assumption that the desirability of a particular alternative depends on how well its effect compares to the key evaluation factors. For example, if a stakeholder considers one aspect of services as more important e.g., grounds maintenance as opposed to custodial services, the relative scores will be based on the desires of that stakeholder relative to all aspects of that various service. In that way, MAU models provide a structured way to weight, evaluate, and compare possible alternatives. They offer a quantifiable method for choosing among options.²⁶

A MAU model also considers the effects of changing the various attributes, their weights, or the scores they receive. If it appears that the interdependence of a particular attribute is skewing the data, then the weights associated with that attribute can be adjusted to change the final outcome. By manipulating the model enough times, it can determine whether the differences in the changing of the weighted averages actually matters to the final decision.²⁷

A very useful benefit of using a MAU model is that it clearly identifies which alternatives are being considered. This provides added value when working in a diverse stakeholder situation where each group has extremely different viewpoints in the relative importance in the alternatives available for consideration.²⁸

A limitation of the MAU model is that it represents multiple stakeholders, and therefore to build the model requires a group consensus. So to be effective, representatives of the affected groups must agree on the attributes included in the model and on the weights to be used to indicate their relative importance. It may be very difficult and time consuming, or even impossible to achieve consensus on very controversial decisions.²⁹

²⁶ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

²⁷ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

²⁸ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

²⁹ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

Depending on the types of value analysis that are applicable to the context of the study, the following questions should be considered in the appraisal process overview:

- What type of appraisal is required?
- What form will the appraisal take?
- Over what time period is the decision appraised?
- What costs and benefits should be included?
- Should inflation be dealt with in the appraisal?
- What discount rate should be used?
- Do all options have the same life in terms of periodicity?
- Do all options have the same impact on the overall strategy?
- Can all costs and benefits be quantified?
- How should the results be presented?

C. DEVELOPING THE MULTIPLE ACCOUNT EVALUATION (MAE) FRAMEWORK

Multiple criteria decisions have a three-dimensional complexity: the stakeholders are numerous, there are countless alternatives to consider, and the objectives are to maximize the reflection of the multiple stakeholders' goals. Impacts to the customer are only one group of criteria for which the relative worth of services are judged. As a justification for the approach proposed in this report for costing services impacts, it is helpful to elaborate on the different evaluation methods used within the multiple criteria appraisal frameworks. Several concepts need to be explained first.³⁰

The multiple criteria are derived from multiple objectives of a decision on whether to maintain, eliminate, or revise a service rendered. The objectives are more concrete than the goals above them, but still may be difficult to measure. Consider, for example, the goal of providing attractive grounds for a base to increase the aesthetic value to the end-users of the base. It can be translated into the objectives of pure aesthetics for users of the base and visitors, decreased costs associated with grounds maintenance requirements (mowing, weeding, etc.) through the transference of lands to more minimal maintenance types of landscapes, or increased areas of ground

³⁰ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

maintenance to minimize blowing debris and potential damage to buildings and vehicles of the base users. These categories could be further decomposed into more specific elements or criteria. For example, considering aesthetics, this could be broken down into categories of perception of the base condition of visitors, providing a positive environment for users, and the maintenance of distinct areas that could be determined to be of historical significance.

A measure of merit, or an attribute, is developed for each service, which captures the differences between different alternatives proposed as a solution to achieve the objectives of the project or policy. The attributes must be meaningful with respect to the criteria, well defined and reasonably measurable. Some criteria, however, cannot be measured, thus the attributes are qualitative out of necessity, such as the low, medium, and high levels of maintenance required for ground maintenance services. This could be based on attributes determined by location relative to the base, usage by residents, and areas that are encompassed by these areas. Maintenance levels in terms of monetary significance may be the corresponding aesthetic value of time for customers expressed in dollars, but expressed in comparative terms in determining whether considering budgetary shortfalls, which areas may have the least impact on aesthetics and still contribute to cost saving measures based on the sensitivity of the perception of the customer.

We will use a Multiple Account Evaluation (MAE) to support decision-making about service levels. We have used the general guidelines for multi-objective decision making for the overall levels of services provided by Public Works, with due consideration to the environmental impacts.³¹

The MAE framework is based on a number of tenets of rational decision analysis:

- The full set of alternatives should be considered.
- Account for the full set of objectives.
- Some criteria cannot be directly measured and must be described in qualitative terms.

³¹ Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

- Value judgments are the mandate of the decision maker, while the analyst provides a comprehensive and trustworthy information base for the decision.
- The guidelines stipulate the following criteria groups or accounts:
- Financial, including capital and operating costs, as well as considerations to all base stakeholders as a result of the proposed change in or deletion of a service level.
- Customer service, covering all aspects of customer satisfaction. In the case of janitorial services, this account includes health, aesthetics, safety, security, convenience, comfort and monetary costs.
- Base and regional environmental impacts of services use, and aesthetic, ecological and cultural attributes of the base.
- Economic considerations, which should measure the net benefits that occurs with maintaining the respective service, as much as is possible.
- Social account, which should document the base community or perceived impacts and trade-offs that the alternatives may entail.

The MAE guidelines assign the flexibility of selecting an evaluation method to the decision maker. A number of methods are suitable towards structured and formal multi-criteria evaluation for decision making:³²

- Cost benefit analysis (CBA)
- Social cost benefit analysis (SCBA)
- Multi-attribute utility (MAU) approach
- Weighting, rating, and scoring schemes

According to Borchering, Katrin; Eppel, Thomas; and Winterfeldt, Detlof, international authorities in the study of multiple criteria decision analysis, analysts are urged to consider the results of different methods of value assessment. In their study, “Evaluation and Monetization Concepts and Techniques”:

Eppel (1992) observed that more than one approach should be used in any application of multiple criteria decision analysis, and Hobbs and Meier (1994) tested the proposition in a complex decision-modeling case study of major electric utilities. No single method was unambiguously more valid than the others, as each has potential flaws, and decision makers find that different methods represent their preferences differently. The analyst’s best course of action is to present the results of different methods

³² Bein, Peter, Monetization of Environmental Impacts of Roads., <http://www.geocities.com/davefengus/transportation/2Chap.htm> (Accessed <July 17, 2005>).

and allow decision makers to consider the differences. The extra effort is not onerous, according to Hobbs and Meier, but the potential benefits are great in terms of enhanced confidence and a more reliable process. While this observation might have merit in the context of strategic decision making, using too many methods at the tactical planning and operational level would be impractical.³³

D. SUMMARY

Determining the value of a service is difficult in that the value is perceived, and not directly stated in terms of dollars. None the less, the stakeholder benefits from services, and if they weren't available, the level of customer service would be lessened. In measuring a value for a service we have to remember that it is inherently subjective in nature, and that any method of value determination will be somewhat inaccurate and somewhat biased. Regardless, it is essential that all accepted methods of measurement are considered, and the correct questions are asked to ensure that the measurement is as comprehensive and complete as possible. As with any intangible item, it is not possible to assign numerical values to it purely on the basis of cost. Therefore the aspects of the service that qualify measured against the relative value to the various stakeholders based on a weighted average produce the best results in a comparative analysis.

³³ Eppel, T., Description and Procedure Invariance in Multi-attribute Utility Measurement, School of Management, Purdue University, May 1992, <http://www.geocities.com/davefergus/Transportation/2CHAP2.htm>, (Accessed <July 06, 2005>)

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V. THE COST BENEFIT ANALYSIS

A. INTRODUCTION

Cost benefit analysis (CBA) is the framework recommended by Federal government agencies to better allocate financial resources. This Chapter presents the background of CBA. A warning to the reader; this is an in-depth discussion of the theory of CBA. If you are unfamiliar with the concepts associated with this method of measuring costs and values, it will provide insight into the origin of the method and a decomposition of the building blocks associated with the methodology. CBA is the accepted method for the Navy to assist in the decision making process.³⁴

This section explains how CBA encompasses a wide range of techniques and applications. It is a method for measuring value (both monetary and non-monetary), comparing alternatives, and identifying opportunity costs. A CBA may be a straightforward method to mathematically measure a choice between two tangible items, or may be an objective way to provide value and the basis for choice between two intangible items or courses of action.

Finally, we will explore the steps involved in a CBA. The methods to assess benefits and costs will also be used as a method to assess stakeholder value and provide a comparative analysis of alternatives and their value. We will also identify the most common errors found when using CBA studies and alternative techniques that can be employed when real world constraints limit the ability to conduct CBA studies. This chapter is designed to provide the readers with enough information so they can more fully understand the findings of our stakeholder analysis further in the paper.

B. A BRIEF HISTORY

The concept of Cost Benefit Analysis (CBA) was presented with the publication of the essay "On the Measurement of the Utility of Public Works" by Jules Dupruit, a French engineer. Dupruit stated in his essay: "Legislators have prescribed the formalities necessary for certain works to be declared of public utility; political economy has not yet

³⁴ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

defined in any precise manner the conditions which these works must fulfill in order to be really useful; at least, the ideas which have been put about on this subject appear to us to be 'vague, incomplete and often inaccurate.'³⁵ Dupruit's major contribution to the economic literature was the idea that the output of a project multiplied by its price is equal to the minimum social benefit of a project; some consumers might be willing to pay more than the market price and so enjoy excess utility. The concept of excess utility was later labeled by Alfred Marshall as consumer's surplus. This idea led directly to the concept of net social benefit, which now is basic to CBA.³⁶ Dupruit's essay represented the beginning of a line of thinking that influenced the budgetary process and modified how government opted among projects. In spite of its vagueness, incompleteness and inaccuracies, the concept that analytical tools should be used to measure the benefits of a project was the first step which led to the systematic use of CBA as a method to evaluate policies.

The first practical application of CBA was when it formally became part of the Flood Control Act of 1936. By this act, the Congress declared that benefits of federal projects "to whomsoever they may accrue (be) in excess of estimated costs." ³⁷ However, no standardized procedure was determined and different agencies adopted different rules to estimate costs and benefits of their projects.³⁸

During the Lyndon Johnson Administration, the government transitioned to a more business-like approach to executing the Federal Budget, and implemented a Planning Programming Budget System (PPBS) to refine the process of decision making under fiscal constraints. PPBS was not a CBA method but did cause decision makers to choose between alternatives to execute within the limitations a proposed budget. CBA techniques were used as a method of system analysis in the Department of Defense.

³⁵Dupruit, J., On the Measurement of Utility of Public Works, International Economic Papers 2, 1952. p. 831

³⁶ Sassone, Peter G.; Schaffer, William A., Cost-Benefit Analysis: A Handbook, Academic Press, 1978, p. 41.

³⁷Gramlich, Edward M., A Guide to Benefit-Cost Analysis, Second Edition, Waveland Press, Inc., 1990, p.21.

³⁸ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

Under President Carter the Office of Management and Budget adopted the principle of a Zero-Based Budgeting System for the same reason. And under President Ronald Reagan the government tried to apply formal cost-benefit analysis to health, safety, and environmental regulations.³⁹ The adaptation of CBA in the government led to the system being studied in the civilian sector which has produced a lot of techniques and theories on the subject.⁴⁰

C. THE CURRENT APPLICATION OF CBA

The Office of Management and Budget (OMB) institutionalized CBA and explained the practical application when it issued OMB Circular Number A-94, which encouraged the integration of CBA into the decision-making process of federal agencies.⁴¹ Circular A-94 details procedures, cost measuring, and analysis so organizations can use them as an evaluation tool to the design and formulation of policies and the execution of fiscal decisions.⁴² Circular A-94 clearly states the purpose of its guidelines to be the promotion of efficient resource allocation through well-informed decision-making by the Federal Government.⁴³

In the 1990's, the government instituted management reforms to make agencies more accountable. The 1993 Government Performance and Results Act (GPRA) requires that funding decisions be correlated to program performance. Agencies must set outcome goals, measure performance and report accomplishments, and the reports must be associated with cost data to aid funding decisions. The act motivates analysts to replace internal budget reports with useful, real-time cost data to help them choose the most

³⁹ Gramlich, Edward M., *A Guide to Benefit-Cost Analysis*, Second Edition, Waveland Press, Inc., 1990, p.21.

⁴⁰ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

⁴¹ <OMB Circular A-94> <On line> <<http://www.whitehouse.gov/omb/fedreg/2004/040226-a94.pdf>>, (Accessed <July 06, 2005>)

⁴² Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

⁴³ <OMB Circular A-94> <On line> <<http://www.whitehouse.gov/omb/circulars/a094/a094.pdf>>, (Accessed <July 06, 2005>).

effective approaches to achieving output goals.⁴⁴ The 1996 Federal Financial Management Improvement Act (FMIA) requires that financial systems comply with federal standards, and financial data will be used to evaluate decisions.⁴⁵

The government efforts mentioned above represent the importance that is inherent in making financial decisions to conform with budgetary constraints and to best use the monies available to accomplish their mission, and in this case to provide the best level of service possible to the customer. Dwindling fiscal resources and the insistence by the DoD to transform into organizations that are business-focused necessitates that bases and regions have all tools necessary at their disposal both in terms of qualified financial planners and the best software systems to help them accomplish this goal. Regional cognizant authorities and for that matter the cognizant authorities for the DoD should ensure that regions have access to qualified individuals who can act in a support or advisement role for bases to assist/perform more CBA studies and ensure that supporting software and tools are available to help them perform accurate cost and benefit analysis to more effectively manage their activities.

D. DIFFICULTIES IN USING CBA

At face value the CBA framework is relatively simple and useful as an organizing device to support choices among alternatives. However, one should not assume that it is a decision that should be made without considering the possible ramifications that could follow a decision. In other words, one must use reason and explore the practicality of making any decision, and should always consider the impact on the various stakeholders. CBA is only a technique to methodically come to a conclusion, and works best if the analyzers have an in-depth understanding of the framework for which the decision will be made and an understanding of the processes that the action will affect. The ability to make a valid decision based on this method is correlated with the completeness of the study and the ability to envision and explore possible alternatives.

⁴⁴ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

⁴⁵ Laurent, Anne, Results Rule, Government Executive, January 2000, p. 25.

Sometimes there is no good alternative to explore and in that case, it is a decision of the lesser of two undesirable situations. CBA does not just address cost, but also must consider value to the stakeholder which makes the technique much more complicated. The analyst should be diligent in their quest to seek out input from the stakeholders to ensure that they have had an opportunity to provide input, and therefore are more likely to 'buy-in' to the decision that is being made. Any study should strive to be as accurate and complete as possible which will sometimes lead to making unpopular and difficult decisions. This is a method of gather data to give substance to a decision but not a perfect solution by any stretch of the imagination.

This point is clearly stated by John Maynard Keynes in his introduction to the Cambridge Economic Handbook:

The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its processor to draw correct conclusions. Another common misconception is that cost and benefit data are systematically available and are easy to gather. Analysts often face enormous difficulties in finding accurate data to perform CBA studies. Besides uncertainty, that obscures the cost and benefit estimates, a major reason to the lack of sufficient data is the almost non-existent literature on ex post CBA. Ex post CBA is conducted at the end of a project, when all costs and benefits were accrued and, therefore, uncertainty plays a smaller role. The value of ex post analysis is that it provides information not only about a particular project but also about the "class" of such project, contributing to the learning process about whether particular classes or types of projects are worthwhile. In addition, comparison studies between ex ante (standard) and ex post CBA provides analysts with a source of data useful for learning about the efficacy of CBA as an evaluative tool.⁴⁶

One drawback to any study is the conflict between the desire to provide the best product in terms of a study and data based analysis and the regular rigors of work schedules. For this reason most if not all studies are performed ex ante to provide the basis for a decision, when the optimal environment would be an ex post study to determine the correctness of that decision which would provide a more comprehensive

⁴⁶ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 31.

data base of decisions and workable solutions to decisions made under fiscal constraints. There is no requirement for decisions to be made ex ante or ex post, but failing to do so certainly promotes inefficiencies, and eliminates viable lessons learned. This fortifies the previous comments that bases without professionals who are well versed in these procedures to assist in these endeavors are at a disadvantage.

E. COST-BENEFIT ANALYSIS CONCEPT

Using CBA techniques provides an objective measurement to determine courses of action when confronted with choices amongst scarce resources. In more applicable terminology for the area of base services, the objective is to determine how to properly distribute funds to adequately provide services to meet the basic needs of the stakeholders without degrading base operations. This can reflect social costing among the stakeholders.⁴⁷ CBA provides a framework for organizing information objectively and independently of agenda, personal biases or perceived values. It can be defined as: An estimation and evaluation of net benefits associated with alternatives for achieving defined public goals.⁴⁸

CBA can also be understood as: An analytic framework for organizing thoughts, listing the pros and cons of alternatives, and determining values for all relevant factors so that the alternatives can be ranked.⁴⁹

Therefore, one of the most important reasons to use CBA is that it provides an unemotional model that presents facts based on data collection and analysis of the available choices. CBA studies allow analysts to identify costs and benefits from the stakeholder's perspective, in terms of social gains and losses rather than cash or revenue flows. The procedure involves a systematic categorization of impacts as benefits and costs, assessing them in terms of dollars or relative values and then determining the net

⁴⁷ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 21.

⁴⁸ Sassone, Peter G.; Schaffer, William A., *Cost-Benefit Analysis: A Handbook*, Academic Press, 1978, p. 31.

⁴⁹ Schmid, A. Allan, *Benefit-Cost Analysis: A Political Economy Approach*, Westview Press, Inc., 1989, p. 11.

benefits (benefits minus costs) of the proposal.⁵⁰ That framework enables policy decisions about the allocation of scarce resources, and can support the decision in favor of a specific action. In addition, CBA provides historical data for future studies. When the analysis is conducted post ante, all costs and benefits are evident and there is less uncertainty about the validity of the course of action.⁵¹ This detailed information would significantly contribute to the studies for future decisions and provide lessons learned for other groups to use that analysis to make similar decisions and evaluate their own situation.

In context of the study to determine the best way to administer services at Naval Postgraduate School, CBA will endeavor to determine the best way to make a decision to alter service contracts to save money. In terms of this study, it is more accurate to say that CBA will provide a way to best decrease services provided based on value assessments and consideration of the impact on the stakeholders.

F. MEASURES OF ALLOCATIVE EFFICIENCY

CBA is generally considered as a legitimate basis for measuring allocative efficiency.⁵² It serves as a basis to make judgments of alternative fiscal allocation decisions based on a relative efficiency. To apply this definition it requires a brief description of allocative efficiency.⁵³

1. Pareto Efficiency

Modern economic thought defines Pareto Efficiency in the following way:

“An allocation of goods is Pareto efficient if no alternative allocation can make at least one person better off without making anyone else worse off.”⁵⁴

⁵⁰ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 21.

⁵¹ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

⁵² Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 28.

⁵³ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

⁵⁴ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 29.

In the context of making decisions on services provided, actions taken can only be made to improve the well-being of one stakeholder at the expense of the well-being of another stakeholder. Thus if a new combination of resources can be found that makes one person better off without making another person worse off, then the new combination will improve efficiency. That is, if any allocation of resources is not satisfying the Pareto Efficiency criterion, there is a possibility for a Pareto improvement. The calculated net benefits of a government investment project provide the condition for Pareto improvement, so:

“If a policy has positive net benefits, then it is possible to find a set of transfers that makes at least one person better off without making anyone else worse off.”⁵⁵

The Pareto Efficiency is difficult to achieve. It implies that every person who loses from a project be compensated; thus, benefits and costs should be measured for each individual and compensation transferred accordingly. This would cause CBA studies to be expensive and complicated, and the need to compensate at the individual level could cause the overstating of costs and understating of benefits; which would distort the project’s true value.⁵⁶

In terms of this study, the more correct application of this concept is that if an action has the least net loss, then it is possible to find a set of transfers that makes minimizes the impact on multiple stakeholders and therefore the same concept of efficiency exists.

2. Potential Pareto Efficiency

Alternatively, analysts use a modified criterion referred to as Potential Pareto Efficiency, or the Kaldor-Hicks rule, to justify any reallocation of resources in a more practical way.⁵⁷ The Kaldor-Hicks rule can be stated: A Kaldor improvement is a change from a given output-mix distributed in a given way to another output-mix which would

⁵⁵ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 301.

⁵⁶ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

⁵⁷ Nas, Tevfik F., *Cost-Benefit Analysis Theory and Application*, Sage Publications, Inc., 1996, p. 16.

enable the gainers to compensate the losers while continuing to gain themselves. Since the compensation needs only to be hypothetical, a Kaldor improvement offers only a potential Pareto improvement.⁵⁸

The Potential Pareto Efficiency criterion provides the basis for two important practical decision rules used in CBA studies. First, adopt all and only policies that have positive net benefits. Second, choose the combination of policies that maximizes net benefits.⁵⁹

G. CONSUMER'S SURPLUS AND WILLINGNESS TO PAY

In general, CBA studies the value of a good to a person that is measured in terms of what this person is willing-to-pay for a particular good or service. A simple definition of consumer's surplus is: It is the maximum sum of money a consumer would be willing to pay for a given amount of the good, less the amount he actually pays.⁶⁰

Analysts should survey the payments each person would have to make or to receive under the policy and how it differs from the status quo. For example, if person 1 is indifferent between paying \$50 to have a policy and the status quo, the \$50 value is her willingness-to-pay (WTP) for this policy. The aggregate sum of these values for all members of the society affected by the policy represents the net benefits of the impacts of the policy. The WTP amounts can be positive if a person places positive value on the policy. Alternatively, WTP can be negative if a person opposes the policy and would have to be compensated if the policy were implemented. The positive amounts are considered the benefits of the policy and the negative values the costs.⁶¹ Linking the concept of WTP with the Potential Pareto Efficiency described earlier, we derive that if

⁵⁸ Layard, Richard; Glaister, Stephen, *Cost Benefit Analysis*, Second Edition, Cambridge University Press, 1994, p. 182.

⁵⁹ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

⁶⁰ Mishan, E. J., *Cost-Benefit Analysis*, Fourth Edition, Unwin Hyman Ltd, 1988, p. 231.

⁶¹ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

and only if the aggregate net benefits of the policy as measured by the willingness-to-pay of affected individuals are positive, then there exist sets of contributions and payments that make the policy a Pareto improvement over the status quo.⁶²

In this context, the focus is on what the stakeholder is willing to give up in relative terms. An alternate way of viewing the same concept, this is an acceptable way to determine WTP. As a service provided will most likely be reduced or altered to accommodate budgetary requirements, there is the possibility to assess the willingness to pay in a more accurate context of willingness to give up. This is determined by measuring relative value from the various stakeholders.

H. OPPORTUNITY COST

The provision of services to an organization requires inputs - capital, labor, materials, etc. The application of these inputs should be measured in terms of what stakeholders must forgo elsewhere when they are employed in a given use.⁶³ So, the opportunity cost of providing an input to execute a service level strategy is its value in the best alternative use.⁶⁴

Identifying opportunity costs applies a dollar value to the inputs needed to execute a service strategy. When determining whether to implement a particular strategy, the decision makers should see if it satisfies the Pareto improvement rule. The required expenditures, measured in terms of opportunity costs, should be compared with the status quo and if the net benefits of a policy are positive, then it is potentially Pareto improving.⁶⁵ The most practical way to measure the values of this strategy is to determine possible detrimental effects of an action, and poll the stakeholders that are affected by this policy shift to determine possible intrinsic impacts from the new strategy. The assessed value of the strategy shift will be a function of individual preferences

⁶² Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 311.

⁶³ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

⁶⁴ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 311.

⁶⁵ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

constrained by the distribution of wealth, thus expressing the willingness to pay, or willingness to give up for this change in the execution of the service expenditure strategy.⁶⁶

I. DEADWEIGHT LOSS

Military bases are funded by tax dollars, and because of that, any savings of expenditures effectively raise government's revenue. Both 'providers' and 'providees' are effectively worse off when budgets are cut and the level of overall services are reduced. The reduced welfare of 'providers' and 'providees' is transferred to the government in the form of revenue effectively returned to the government by reduced base expenditures. However, the buyers' and sellers' losses exceed the government's gains because these savings are distortions in that the efforts of bases to decrease expenditures is not met with a one for one return to the governments funding sources. Therefore, if a particular base saves money on a specific effort, there is no recouping of funds for uses in other areas. The difference between the providers' and providees' losses and the government gains is effectively the deadweight loss. It represents transfers from base savings that do not directly accrue to any other group.⁶⁷ In principle, if a given government project is funded through taxation, the resulting deadweight loss – should be counted in calculating the change in the service provision strategy.⁶⁸

J. SHADOW PRICING

A loose description of shadow pricing should be considered in this case even though actual dollar amounts of 'market' items are not the part of the study. But shadow prices tell us the impact of various changes in expenditures and for that reason, we are considering shadow pricing in our overall determination of value.

⁶⁶ Schmid, A. Allan, *Benefit-Cost Analysis: A Political Economy Approach*, Westview Press, Inc., 1989, p. 591.

⁶⁷ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

⁶⁸ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 57 and 62.

When market distortions and market failures lead to a divergence between market price and marginal social cost or marginal social benefit, analysts try to obtain an estimate of what the market price would be if the relevant good or service were traded in a perfect market. Such an estimate is called a shadow price.⁶⁹

The dollar value of the change should first be determined. If the market does not provide accurate dollar amounts to the change, analysts may effectively correct the existing value, if any, or attribute value to un-priced gains and losses that the policy is expected to generate. The reader should be aware that there is no comprehensive and foolproof set of procedures for shadow pricing. Unfortunately, subjective judgment often weighs heavily in shadow pricing exercises.⁷⁰ Therefore, analysts should be cautious in correcting the differences between the actual and the adjusted prices. Externalities, monopolies, government intervention, public goods, and other market imperfections should be carefully examined. Analysts should base their estimations and adjustments based on these imperfections and select the best alternative to represent opportunity costs and net benefits.⁷¹

K. DISCOUNTING MECHANISMS

The benefits of a decision are determined in the future. Also, some costs incurred may take place in the future. As the consequences of the policy extend over time, it is necessary to use techniques that recognize the time value of money. A dollar today is worth more than a dollar a year from now. The net benefits of a policy have to be converted into present values using an appropriate discount rate. Thus, analysts need a discount rate that is appropriate from society's perspective.⁷² The discount rate that

⁶⁹ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 293.

⁷⁰ Sassone, Peter G.; Schaffer, William A., *Cost-Benefit Analysis: A Handbook*, Academic Press, 1978, p. 51.

⁷¹ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

⁷² Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

represents the society's perspectives is the social discount rate. By definition, the net present value (NPV) of a policy equals the present value of the benefits (B) minus the present value of the Costs (C): $NPV = PV(B) - PV(C)$.

The estimation of the rate of inflation is another concern analysts should be worried about when performing CBA studies. Potential sources for the expected inflation rates are economic magazines, government's departments of finance/statistics, and the long-term bond yield, and the Organization for Economic and Cultural Development (OECD).^{73 74}

The federal government, through the Office of Management and Budget (OMB) sets its discount rate policy. OMB Circular No. A-94 provides guidelines and discount rates for CBA of government programs and will be the subject of a future section.

L. UNCERTAINTY AND SENSITIVITY ANALYSIS

Analysts make subjective assumptions in predicting future costs and benefits, discount rates, inflation rates, and other key elements of the present value formula. During time, prices of inputs and outputs to the project may change as a result of shifts in preferences, technology and the actions of competitors. Some of these measures and estimates lack precision because of the variety of methods used in their quantification.⁷⁵ Consequently, these assumptions introduce a significant amount of uncertainty in CBA studies. Two approaches to sensitivity analysis help analysts to overcome uncertainty in CBA studies: the partial sensitivity analysis and the selective sensitivity analysis.

1. Partial Sensitivity Analysis

The purpose of sensitivity analysis is to acknowledge uncertainty.⁷⁶ Analysts may use a range when estimating benefits, costs, and discounting rates to determine the net

⁷³ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 130.

⁷⁴ Gramlich, Edward M., *A Guide to Benefit-Cost Analysis*, Second Edition, Waveland Press, Inc., 1990, p. 97.

⁷⁵ Nas, Tevfik F., *Cost-Benefit Analysis Theory and Application*, Sage Publications, Inc., 1996, p. 127.

⁷⁶ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 196.

benefits of a specific decision. Thus, analysts do partial sensitivity analysis, varying a single assumption while keeping all others constant, to determine the effects on the decision's net benefits.⁷⁷

2. Selective Sensitivity Analysis

In a selective sensitivity analysis, analysts select a variable that is subject to error and capable of significantly affecting NPV calculations.⁷⁸ Then, the analyst selects the "worst and the best-case", and sometimes a "medium" value for this variable, with the purpose of determining whether the NPV changes from acceptable (positive NPV) to not acceptable (negative NPV). Regardless of the method used in sensitivity testing, the outcome of the sensitivity analysis test will point out possible areas for improvement, integrate risk and reduce uncertainty in CBA studies.^{79 80}

M. COMMON ERRORS IN CBA

Biased estimates in determining benefits and costs inject errors into CBA studies. There is considerable evidence that programs managers systematically overestimate benefits and underestimate costs.⁸¹ First, analysts may omit some benefits and costs because they think they are too unlikely to occur especially during determinations of the impacts of a decision. Second, double counting frequently occurs when analysts count benefits and costs that arise both in primary and secondary markets. Conceptually, benefits and costs arising in secondary markets should be disregarded. Changes in secondary markets result mainly from relative price changes in both primary factor and commodity markets and involve only redistributive outcomes; therefore, should be avoided.⁸²

⁷⁷ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

⁷⁸ Sassone, Peter G.; Schaffer, William A., Cost-Benefit Analysis: A Handbook, Academic Press, 1978, p. 142.

⁷⁹ Nas, Tevfik F., Cost-Benefit Analysis Theory and Application, Sage Publications, Inc., 1996, p. 129.

⁸⁰ Silva, Carlos. An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment (Unpublished MS Thesis). Naval Postgraduate School.

⁸¹ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., Cost-Benefit Analysis - Concepts and Practice, Prentice Hall, Inc., 1996, p. 429.

⁸² Nas, Tevfik F., Cost-Benefit Analysis Theory and Application, Sage Publications, Inc., 1996, p. 82-83.

Third, the future is not certain and using historical data as a basis for forecasting may cause errors in estimation.⁸³ In general, people underemphasize bad events and overemphasize good events. Finally, events may be observed, recorded or interpreted inaccurately.⁸⁴ The inaccurate measurement of events then becomes imbedded in all decisions that are influenced by those observations.⁸⁵

N. SUMMARY

This chapter presented the history of CBA and applied its role in the government and in the DoD's transformation into a more structured business environment. The origin of CBA was briefly identified and discussed as a method for any organization that deals with budget management and can help make better decisions when dealing with decreasing levels of funding. While this does nothing to increase capabilities, it does give those decisions more credibility in that the consideration of alternatives was developed using proven analytical techniques and analysis.

Additionally, the earnest attempts to use the CBA techniques by individuals without some sort of formal training or expertise in the field diminish the ability to fully utilize its potential. That aspect considered, it is still the best alternative and if this method of decision making is desired as an institutionalized routine practice, then the case could be made to have professional consultants available through regional Immediate Superiors in Command (ISIC) to assist those bases that lack that expertise. This background and brief discussion is important for the reader to understand both the necessity of the CBA method and the realities of decision making which confronting those entities charged with making decisions that affect service provided to stakeholders.

⁸³ Ballou, Ronald H., *Business Logistics Management*, Third Edition, Prentice Hall, Inc., 1992, p. 121.

⁸⁴ Boardman, Anthony E.; Greenberg, David H.; Vining, Aidan R.; Weimer, David L., *Cost-Benefit Analysis - Concepts and Practice*, Prentice Hall, Inc., 1996, p. 43.

⁸⁵ Silva, Carlos. *An Evaluation of the Application of Economic Analysis and Cost-Benefit Analysis Tools in the DOD environment* (Unpublished MS Thesis). Naval Postgraduate School.

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VI. ESTABLISHING PERFORMANCE MEASURES INTO THE STRATEGIC PLAN

A. INTRODUCTION

Organizations are always trying to do more with less. Stephen Covey, the author of “7 habits of highly effective people” puts it this way: “People and their managers are working so hard to be sure things are done right, that they hardly have time to decide if they are doing the right things.”⁸⁶ Doing the right things and doing things right is difficult to balance, wasting efforts down the wrong path only makes the situation worse.

The goal of an improving an organization is futile if you can’t measure its success. The organization first needs to look internally to determine if it is functioning properly to accomplish its mission. To determine success requires the organization to understand three things:

- First, understand how the organization fits into the strategy of the base that it supports.
- Second, is to understand the divisions of the organization; how they interact, and how well they perform together to accomplish the overall mission of the organization.
- Finally, the organization must understand and examine the processes that these individuals and divisions perform and control, and how well they are being executed.

Success also needs to be measured externally. It is essential that all stakeholders can determine how well the organization is performing and how effectively it provides for them. In 1998, the Navy published a study from the Naval Studies and the National Research Council called, “Recapitalizing the Navy.” In that study, there was an analysis of change and promoting efficiency at Navy Shore Installations. The group that developed that study was comprised of retired executives from large corporations and

⁸⁶ Covey, Stephen R., 7 Habits of Highly Effective People: Powerful Lessons in Personal Change, Simon Schuster, 1989, p. 52.

various members of strategic studies groups. They concluded that an organization should attempt to emulate the best practices available from any compatible organization to help develop their strategy to accomplish their goals.⁸⁷

That thought brought us to the conclusion that running a base is no different than running a city. Therefore, we conducted a research study to find the best practices available from various cities and bases across the country that could be implemented at the Naval Postgraduate School (NPS) Public Works department. Based on our research, this section explores some ‘best practices’ and ‘effective performance measures’ that are used successfully by both military and civilian organizations. Additionally, we will provide insights applicable to NPS on how an organization should analyze itself, develop a strategy to provide for its stakeholders, measure its success, and report those successes and challenges to their stakeholders.

B. ANALYZING THE ORGANIZATION

While there is no guarantee that any one method will work at any organization, the goal is to capitalize on the lessons learned from other “like” organizations. When looking at a base infrastructure, notably the Naval Postgraduate School, it is important not to only focus on it as a military base, but consider as a city.

There is always some element of risk when any organization attempts to do something new, but it is incumbent as the executor of public funds, to make the best efforts to improve efficiency and not sacrifice the quality of the services rendered to the stakeholders. By considering the following techniques carefully and selecting the correct ones for the circumstances, an organization will have a high probability of success.

1. Measure Your Current Performance Level

It is essential to understand the assets that are available, how they are employed, and what output they produce. Then develop metrics to measure how well these assets are used. This will help in making reports to your superior organizations and stakeholders. For example:

⁸⁷ Recaptializing the Navy: A strategy for managing the infrastructure/Committee on Shore Installation Readiness and Management, Naval Studies Board, Commission on Physical Sciences, Mathematics, and Applications. National Research Council (U.S.), Naval Studies Board, Committee on Shore Installation Readiness and Management. National Academy Press, 1998.

- Manpower – How many man-hours are required to accomplish all tasks vs. how many man-hours are available?
- Pest control - How much building square footage exists vs. how much square footage is being treated?

2. Assess Performance and Determine Whether A Change Is Needed

Although it may sound obvious, first make sure that a change in existing performance is needed. Given that most military bases operate within strict budgets, it is important to use funds to get the maximum benefit. Providing the best level of service in all categories is not necessarily an appropriate or achievable goal.

A good idea is to determine what the internal stakeholders (process owners, divisions, and departments) determine to be the best way to allocate funds, and balance that against the external stakeholders' priorities. If both groups agree, this may be an area to explore for potential cost savings. If all both groups agree that a level of service is acceptable, then avoid the temptation to change it. If you determine after this assessment that a change is needed, proceed to the next step.

3. Determine Who Is Doing It Better and How They Are Doing It

Don't reinvent the wheel. The unfortunate thing about any bureaucracy is that there are a lot good 'lessons learned' that aren't shared, or at least not shared in a method that is easy to access. However, it is worth the effort to see what other bases or cities are doing and determine whether it is possible to adopt those same techniques.⁸⁸

While there is a lot of information available via the internet, there is seldom enough time to get to that information. This may be a good opportunity to ask the Naval Region for ideas that have worked at other bases. If this information isn't readily provided, it should be. This is a team effort, and saving taxpayer dollars should be a common goal.

4. Determine What the Stakeholders Think Of Your Performance

The best way to measure effectiveness of the department and the various processes is to ask the stakeholders to assess the level of customer service that they feel

⁸⁸ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Austin, TX.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

they are receiving. Doing this routinely is important so the feedback is timely and relevant. The survey process should be painless to the stakeholder to encourage them to provide input. Anything more than a “rate our service on a scale of 1-5” type survey with an opportunity to provide additional comments will meet with poor response. For most facilities, the survey should be conducted at least yearly, especially if there is an avenue to conduct this via an intranet or via the internet. An organization like the Naval Postgraduate School should conduct their interviews on a semi-annual basis as their student population changes significantly on a quarterly basis. Methods for conducting surveys are discussed in detail in a later chapter.⁸⁹

Once input is provided by the various stakeholders, it is important to future surveys that they know that their input is acknowledged. Publishing the results in a report goes a long way to get them motivated to participate the next time the survey is given. Additionally, comments and suggestions should also be answered or addressed. This methodology will encourage the feeling that their input is important which gives significant “buy-in” not only to the survey process, but also to appreciation for the efforts of the Public Works department’s efforts.

5. Expecting and Rewarding Improvement

Improvement should be expected in any organization. While turnover can be high especially in military managerial positions, a program focused on long-term goals will succeed despite that turnover. And, success should be rewarded. Employees, who achieve a significant process improvement, while also meeting their individual and work-unit goals, should be the prime candidates for appropriate bonus incentives in addition to the verbal recognition that should always be associated with a job well done.⁹⁰

6. Seek Feedback and Act on It

The department should invite feedback from all stakeholders and process owners. The survey method, previously discussed, provides one form of feedback. The survey

⁸⁹ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Austin, TX.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

⁹⁰ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Jacksonville, FL.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

method, previously discussed, provides one form of feedback. The survey is primarily focused on feedback from external stakeholders. In addition, internal stakeholders' feedback is vital. An internal suggestion and feedback processes should be developed. The organization must create an environment that encourages and welcomes feedback from its employees.⁹¹

C. MEASURING PERFORMANCE

1. Scorecard Reporting Using the Quadrant Diagram

One method that can be used to measure the effectiveness of how an organization is providing for its stakeholders is by using a periodic "scorecard." The balanced scorecard system lets an organization look at three different levels of performance.

The concept is to break the organization into different levels and score each area and each level of the organization. For each area, you build a 'scorecard' (shown below) that identifies how high the priority the service is, and how satisfied the customer/stakeholder is with the level of service that is provided. By looking at the 'score' it will become apparent whether action is required in that area.⁹²

For example, NPS could organize some of their scorecards under the headings of the major services that they provide:

- Grounds Maintenance
- Janitorial Services
- Pest/Animal Control

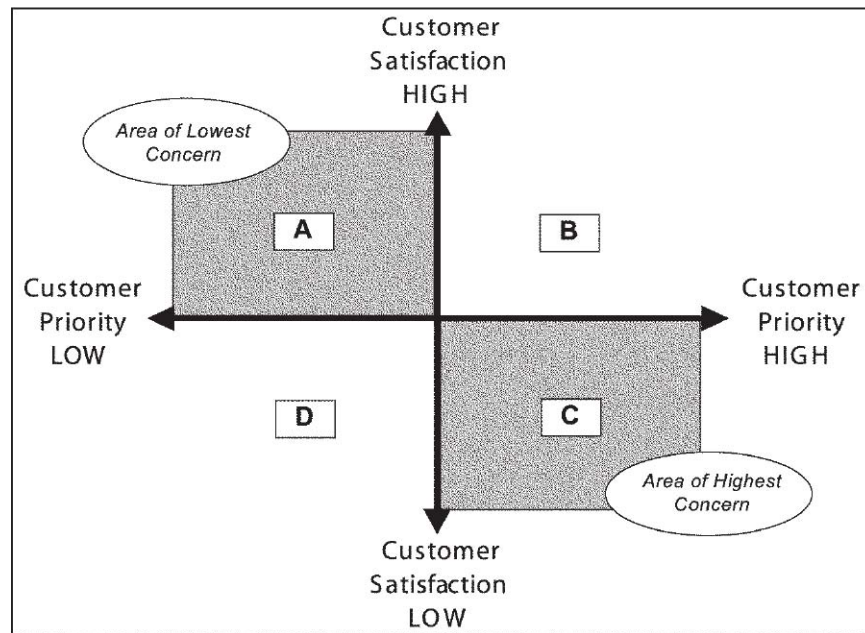
The areas can be analyzed from several different dimensions: organizationally, internally or externally, by processes, or by divisions. This analysis will allow everyone in the organization can see how they are performing, and how well they are supporting the overall mission.

⁹¹ < What Works: Effective Uses of Performance Data. International City/County Management Association, 2002 Case Study on Jacksonville.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

⁹² <What Works: Effective Uses of Performance Data. International City/County Management Association, 2002 Case Study on Austin, Tx.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>, (Accessed <July 11, 2005>).

The stakeholders can be presented in a quadrant diagram for each service or focus area as shown in figure 2. This will provide a snapshot of the process/division/service's effectiveness compared to the stakeholders' priorities and perceived customer satisfaction.

An understanding of the customer's satisfaction and areas of concern, as depicted in Figure 2, will assist base authorities in making decisions regarding the priorities for allocating resources.⁹³



Quadrant A—High satisfaction and low priority levels. Quadrant B—High satisfaction and high priority levels. Quadrant C—Low satisfaction and high priority levels. Quadrant D—Low satisfaction and low priority levels.⁹⁴

Figure 2. Customer Satisfaction Quadrant

2. Scorecard Using 'Objective - Measure – Target' Comparison

A different way of scorecard reporting involves identifying a service or an area of the organization that needs to be measured. Then separating this into an input – process –

⁹³ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Austin, Tx.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

⁹⁴ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

desired output chart on three levels: organizational, division, and process. The following sections provide guidance for developing these three levels of scorecards. Scorecard examples will also be provided.

3. Level One Scorecard – Organizational

The first level of the organization that needs to be measured is the organization as a whole and how its performance affects the base. This balanced scorecard will be more general in nature, and will measure how well the Public Works department is meeting the needs of the base. For the balanced scorecard, the department could measure how well it manages grounds maintenance, how effective pest control programs are, and how well custodial contracts meet the needs of the stakeholder. An example of an organizational balanced scorecard is shown in Table 7.⁹⁵

The basic categories and steps in developing an organizational scorecard are:

- Set an Objective. This is the strategy that must be achieved and what is critical to its success.
- Identify a metric or measure. This will determine how success will be measured and tracked.
- Set a target. Pick out a goal that will reflect the performance or outcome that you expect.
- An optional column not shown in the table below could be “initiatives” that would identify any type of special requirements that are needed to meet the goal, like new equipment, new software program, etc.

It is important to breakdown each process into terms and categories that the stakeholders can understand without extreme detail, or without calling a meeting to explain the process. In other words, keep it as simple as possible.

⁹⁵ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <On line>
<<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>
(Accessed <July 11, 2005>).

Listed in Table 7 are some possible examples of organizational performance measures for the Public Works Department.⁹⁶ These objectives can measure the major processes of the organization and measure how Public Works as an organization is supporting the needs of the base.

Objective	Measure	Target
Provide an optimal level of grounds maintenance to maintain installation aesthetics	Total acreage of the base: Existing service level structure	Decrease acreage in specific care categories to levels to save ____% of expenditures, without decreasing overall condition of base
Maintain Pest Control to prevent infestations and minimize use of chemical measures	Total area of building space that must be sprayed	Decrease amount of treated area by ____% without creating infestation
Maintain trash pickup at a level to maintain sanitary conditions	Total area of trash pickup. Total containers that must be picked up	Decrease amount of trash pickup expenditures by ____%, without creating an unsanitary condition
Stakeholder Satisfaction	Set a level of customer satisfaction and measure against that level	Conduct semi-annual survey to determine satisfaction of stakeholders. Set Goal for ____ level of satisfaction

Table 7. Example Of A Public Works Organizational Scorecard

4. Level Two Scorecard - Departmental

The next level that needs to be measured is the divisions within the organization. This balanced scorecard will be more explicit to specific divisions within the Public Works department and will measure how well that segment of the organization supports the department as a whole. For the balanced scorecard, the department could be divided into categories that would measure how it handles its assets, budget compliance, contract management, manpower utilization, training, and employee satisfaction.

An example of a divisional balanced scorecard is shown in Table 8.⁹⁷

⁹⁶ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

⁹⁷ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

Objective	Measure	Target
General Execution	Satisfy all programmatic requirements	Regional MEO determination of program execution
Budget Compliance	Execute all programs and remain at or below approved funding levels	Set budget thresholds at desired level, and monitor progress toward that goal
Contract Management	Ensure contract compliance to meet requirements of completion.	Measure what 'should' be accomplished versus what 'is' accomplished
Contract Negotiation	Minimize contracts cost while not jeopardizing requirements	Set contract expenditure targets based on input-output analysis
Manpower Utilization	Maintain an accurate accounting of manpower utilization	Manpower available versus manpower required to execute service strategy
Training	Take advantage of all available training programs to comply with regional requirements	Balance against list of available training opportunities
Employee Satisfaction	Set levels and categories of employee satisfaction and measure against that level	Measured by Survey

Table 8. Example of A Divisional Scorecard

5. Level Three Scorecard – Process

In addition to base wide and departmental measures, the Public Works department needs to look at the effectiveness of internal processes. The same discussion continues for setting up the scorecard. In this level, the scorecard would be measuring the individual processes and how their execution affects the division. No example of an actual table is provided, but the table should be set up considering the measurements below:

- Output measures—Count the units of service delivered to stakeholders (e.g., number of man-hours expended per number required as per workload matrix).⁹⁸
- Efficiency measures—Calculate performance in terms of units of service provided per dollar spent, units of service provided per employee, units of service provided per unit of time, or other similar measures (for example, number of hours of trouble call service provided per dollar expended for worker's salary).⁹⁹
- Effectiveness measures—Examples include:
 - Usage rates (e.g., pest control expended on uninhabited buildings, or buildings scheduled for rehab).
 - Speed of service (e.g., response times for trouble calls).
 - Customer satisfaction rates, which could be determined by stakeholder surveys (e.g., percentage of satisfied with the grounds maintenance).¹⁰⁰

D. REPORTING RESULTS

The best results in the world mean nothing if they are not reported. The stakeholders need to be informed of the hard work that is going on to increase efficiency. To prevent or at least curtail stakeholder frustration it is essential to publish the results of your efforts. This is not meant to be a 'feel-good' report, but instead an opportunity to highlight challenges the department faces and success stories from process improvements.

This is not an effort to increase the level of paperwork, or to add another report to the yearly workload. However, maintaining a record of progress and challenges makes it easier to justify and defend requests for increased funding. In addition, it provides an

⁹⁸ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <On line>
<<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>
(Accessed <July 11, 2005>).

⁹⁹ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <On line>
<<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>
(Accessed <July 11, 2005>).

¹⁰⁰ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Calgary, AB, Canada.> <On line>
<<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>
(Accessed <July 11, 2005>).

opportunity to get buy-in from stakeholders when they are confronted with difficult decisions between unpopular alternatives. By making this a yearly effort, it also adds credibility to the professionalism of the organization, and makes it easier to track and update data for subsequent reports. It is always difficult to generate the first report, but follow on reports will be significantly easier.¹⁰¹

The following sections provide guidelines for reporting resulting that may be applicable to NPS.

1. Start with the Basics and Make the Report Substantial

Instead of starting with in-depth reports and graphics, focus on the basic efforts underway to improve/change/alter existing services. The opening should explain the timeframe and the reason for the report. In this case, it is to let everyone know that budgets are being cut and that tailoring of services are required to meet budgetary goals. By providing this framework, the reader will hopefully understand the situation and be more sympathetic to the situation, and will be more appreciative of the efforts that are underway. Below are some general tips:

- If charts are provided, ensure that they are readable. Focus on easy to understand terms like: funding shortfalls, distributed funding by service category, and areas of improvement.
- Show a comparative analysis of the base to other similar bases. This should be based on: mission, size, population, and any other pertinent categories.
- Provide explanatory notes. Detail in the report any pertinent information that shows the uniqueness of the base and any specific funding challenges that is caused by that uniqueness. In addition, provide explanatory information for each graph in the report.
- Describe how the base achieved the performance level shown in the context of current programs and spending levels, as well as the reasons for the base's position relative others in the region, and other comparative bases.
- Suggested Charts and Key areas of explanation for NPS are listed below:

Areas of Responsibility:

¹⁰¹ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Prince William County, VA.> <On line>
<<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>
(Accessed <July 11, 2005>).

- NPS base proper
- Golf course area
- La Mesa areas

Base Population by Stakeholder:

- Military/Base Staff
- Faculty
- Students

Geographic area of responsibility:

- Land in acreage
- Buildings in sq. ft.
- Develop Trend graphs to compare NPS with the regional average. If that data is not readily supplied from region, then this is a systemic weakness that should be corrected.
- Include specific plans for improving or maintaining performance. Detail information about what the spending strategy is for the upcoming year.

By actively and honestly reporting efforts underway and future plans, areas for gaining efficiency will become apparent and will hopefully spur more ideas about methods for improvement from internal and external stakeholders.

2. Focus on Accomplishments

One of the major goals of performance measures report is to focus attention on the department's accomplishments, not just what it is spending or doing. While traditional reports assess a department's performance against a budget, the performance measures report examines program outcomes and assists the department in its efforts to improve its efficiency and effectiveness.¹⁰²

- *Vital indicators*—report the areas that are important to stakeholder satisfaction. This will give the reader a basic understanding of the efforts of the department. Use summary charts to compare actual performance from the previous year to this year. Show last years goals against last year's accomplishments.

¹⁰² < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Bellevue, WA.> <On line> <<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>> (Accessed <July 11, 2005>).

- *Department scorecards*—should be included. This informs the stakeholders of the elements that go into the Public Works department, and makes the report more professional.

3. Capturing Volunteerism in Reports and Exploiting Its Impact

The impact of volunteers is often overlooked. While it is a benefit to have groups on the base volunteer for beautification projects, it can skew the yearly report. If there are units on base that volunteer time or expend efforts to improve the material condition of any structure, or grounds area, NPS needs to account for those hours.

Take for example the following scenario: A group volunteers to restore a certain area of the grounds; NPS does not account for the man-hours expended, supplies and expenses; and the cost savings that were saved to pay a contractor for the same service aren't captured in any report. This scenario would generally lower expenditures for the year. However, it doesn't accurately reflect the labor and expense of the effort which result in the following:

- Indicate that the overall budget was sufficient for that project. This would not show the stress against the budget if the same project were completed at a cost to the department.
- Fail to show the dedication to the installation on the part of the stakeholders. While this may not be captured in purely monetary terms for the purpose of accounting for expenditures, it certainly does indicate the support by the stakeholder to assist in the material upkeep of the base.

Maintaining a basic measurement and accounting for these types of efforts can provide more accurate financial data. Additionally, by exploiting all of the volunteer projects it can encourage more groups to get involved. Volunteer activity also demonstrates the 'pride in the base' on the part of its stakeholders to the military chain of command, and presents a positive image to the local community.¹⁰³

4. When Should We Report?

A yearly report should be sufficient. Route the report through the chain of command so there are no surprises and then publish it to all stakeholders. This information will hopefully promote more ideas in areas of efficiency and programs that

¹⁰³ Recapturing the Navy: A strategy for managing the infrastructure/Committee on Shore Installation, Readiness and Management, Naval Studies Board, Commission on Physical Sciences, Mathematics, and Applications. National Research Council (U.S.), Naval Studies Board, Committee on Shore Installation Readiness and Management. National Academy Press, 1998.

may help in the maintenance of the installation. This is also a good time for the department to conduct a goal setting workshop for the upcoming year, which is another way to focus on long term goals.¹⁰⁴

5. Reporting Information to Different Stakeholders

Not everyone needs the same information. Sharing Performance Information with the various stakeholders requires different releases of information tailored to the intended audience.

For Immediate Superiors in Command (ISIC) the department should present performance data for each of its major processes and use this data to defend and explain budget implications for the past and coming year. It can show how it has used its data to set organizational objectives and budget priorities. This will allow tracking against these objectives not just in terms of multiyear trends after the report has been established to help explain further goals performance improvement.

The report will also provide key performance indicators to assist in defending or altering manpower structures. Performance statistics including employee structure, governmental hiring requirements, and can put manpower costs in perspective to show deficits or to defend the need for future requirements.

6. Using the Report for Employee Evaluations and Incentives

This report has many other uses, such as:

- An incentive measure for all employees as it can show how their efforts affect the success of the department.
- A method to identify outstanding performers in the organization. This will assist in the annual performance evaluation process.
- A basis for the awarding of yearly monetary awards. This is a way of having everyone in on the goal setting process so they can help develop targets for next year's success.
- Highlighting objectives that weren't met. This is a good way of identifying areas that need special attention.

¹⁰⁴ < What Works: Effective Uses of Performance Data. International City/County Management Association. 2002 Case Study on Sterling Heights, MI> <On line>
<<http://www.icma.org/upload/library/2004-07/{27935868-C5FF-48BA-947B-E583495C00BE}.pdf>>
(Accessed <July 11, 2005>).

E. SUMMARY

This section is based on proven techniques in performance measurement. Understanding that most departments have had no formal training in establishing and measuring performance, it is still an effective tool that can be used to analyze the organization, and inform the stakeholder. As has been mentioned several times and will be discussed in the conclusions and areas for continued study of this report, it is imperative that bases receive all assistance available to help implement these types of programs to increase efficiency. The authors of this study understand the difficulties with providing required services despite an under funded budgets, but also understand the quality of individuals in the Public Works departments across the country. With the proper assistance, significant gains in efficiency can occur.

One of the key areas of this section discusses a yearly report. While difficult to implement at first, the strength of a report that focuses on key areas can take the animosity of disgruntled stakeholders away when they have a better understanding what life is really like when challenged with decreasing budgets.

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VII. DATA GATHERING

A. TECHNIQUES TO DESIGN A SURVEY

As history has proven in the majority of cases, organizations faced with onerous decisions often find themselves weighing options between sundry tradeoffs. Particularly when decisions must be made regarding involuntary budget reductions, a clear path upon which to tread does not always readily reveal itself to decision makers. In an ideal case, these critical decisions are not drafted in a vacuum. Rather, careful consideration is devoted to value assessments and how these decisions will ultimately directly affect that group of individuals who have decision-making standing, commonly referred to as the stakeholders.

Constructing a value assessment involves more than just the hard financial aspects of the budget, analyzing services provided at varying costs. A value assessment needs to include some indication of the soft, intangible social benefits enjoyed by the primary stakeholders not apparent through numerical calculations alone. One means by which to glean such valuable information is to issue a survey amongst the organizational stakeholders with which to solicit social benefit feedback. Within a survey, stakeholders have the opportunity to place a value “weight” upon each of the items up for consideration, demonstrating which items hold greater value or importance for the end users. By employing this channel of stakeholder input, decision makers can make a more fully informed decision that encompasses the knowledge of the budget/financial aspects as well as the social aspects surrounding any major budget or service reduction decision.

Maximizing the effectiveness of any survey is vital if the decision-making body wishes to obtain the needed information pertinent to the decisions at hand. At any given time, there are a slew of surveys in revolving distribution, some more effective than others. The following sections are an excerpt from an informational brochure, dated April 2003, distributed by the Fairfax County Department of Systems Management for Human Services¹⁰⁵. This informational brochure details how to construct an effective, useful

¹⁰⁵ “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

survey for general use, one that shall likewise prove to be useful in measuring stakeholder value determinations. This is merely one of many methods available for use in survey construction and distribution. We selected this method due as much for its simplicity as its broad general instructional content.

B. GENERAL SURVEY CONSTRUCTION

A survey is a means of gathering information about a particular population by sampling some, or all, of its members, usually through a system of standardized questions. Surveys can be conducted by mail, telephone, personal interview, or Internet. They can be administered either to individuals or groups. The primary purpose of a survey is to elicit information which, after evaluation, results in a profile or statistical characterization of the population sampled. Questions may be related to behaviors, beliefs, attitudes, and/or characteristics of those surveyed.¹⁰⁶

C. PRELIMINARY CONSIDERATIONS

Need for a survey – Since almost all surveys can be costly, it is critical to discern whether or not the study needs to be done (i.e. is the end information expected to outweigh the cost of administering the survey?). Begin by contacting persons knowledgeable in the field and by performing an environmental scan of other studies conducted on the topics of interest. This work should provide the answers to the following questions:

- Have studies of this subject been done previously?
- Is there literature enough on the subject to answer the question (i.e., books, periodicals, reports)?
- Have other organizations investigated this area, and do they have information available on the subject?
- Can the desired information actually be collected by a survey or would another form of research be more appropriate?
- Is there adequate time and resources available to conduct a survey without skipping steps in the process?

¹⁰⁶ “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

Once the need for a survey is determined, a problem statement and objective must be developed for the survey.¹⁰⁷

Problem statement – A clear, concise statement of the problem to be studied and/or the information desired should be put into writing. It is helpful to list possible causes of the problem, as well as possible solutions. This will help clarify the survey objectives.

Survey objectives – Survey objectives will be concerned with the following issues:

- What information is needed in order to understand the problem, its causes, and possible solutions?
- How will the information be used and by whom?
- What/who is the population to be studied and can all members of the population be located?
- Does the information collected need to be statistically valid and does it need to be generalized to a larger population?
- What kinds of analyses would be useful for understanding the survey results?
- Will the statistics resulting from the analysis of the survey data be appropriate for the sampling plan used as well as the questions to be answered?

Survey budget – When conducting a survey, an adequate budget must be developed to cover all phases of work. This should be done early in the planning process so that expectations for what the survey can accomplish remain realistic in light of financial constraints.

Survey mode – The next step in the process is to determine which survey mode to use. The survey mode is the type of survey that will be conducted. The most frequently used modes include face-to-face or personal interviews, telephone interviews, and written interviews which are usually conducted by mail or Internet. The factors that will determine which mode to choose include financial constraints; resource constraints; and question length, complexity, and sensitivity.¹⁰⁸

¹⁰⁷ “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

¹⁰⁸ “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

D. SURVEY MODES OR TYPES

Face-to-Face Interview

Face-to-face interviews or personal interviews are surveys conducted in person by an interviewer who usually travels to the person being surveyed.

- *Pros* – High response rates; can clarify questions, if necessary; control over respondent selection; can use longer, more complex questionnaire; and easier to motivate the respondent.
- *Cons* – High costs, time-consuming, and more administrative requirements (i.e. selecting and training interviewers, contacting respondents, travel arrangements). Also, there is a tendency for respondents to give socially acceptable answers.

Telephone Interviews

Telephone interviews are usually conducted from a central office that places telephone calls to selected households or businesses.

- *Pros* – Good response rates, fast, some anonymity for respondents in answering questions, and control over respondent selection. If a comprehensive list of the target population is available, the likelihood of obtaining a representative sample is high.
- *Cons* – Questions must be short and not complex; cannot control interruption by others in household/office; hard to find persons at home, and those that are at home may resent intrusion; there is mounting displeasure among households receiving unsolicited telephone calls; requires training and quality control monitoring of the interviewers; and is usually difficult to target a specific geographical location.

Mail Questionnaires

Mail questionnaires are written surveys that are sent through the mail to selected members of the population to be surveyed.

- *Pros* – Good response rates with rigorous follow-up procedures, relatively easy to obtain a listed population and locate respondents, can avoid interviewer bias and distortion, answers unlikely to be socially influenced, easy to administer and relatively low costs, can cover a wide geographical area, and more manageable for handling large samples.
- *Cons* – Questionnaire may be given to someone else to fill out or may not reach the desired respondent; most difficult type of questionnaire to design; hard to interpret open-ended questions; cannot control sequence in which respondents answer questions; and time-consuming, given periodic mail-out requirements.

Internet Questionnaire

An Internet questionnaire is a form of a written survey. Respondents may be invited to participate in the survey through e-mail or because they visit a particular web page.

- *Pros* – Fast to conduct and tabulate, some software products allow questionnaires to be customized depending on the respondent's answers, avoids interviewer bias and distortion, answers unlikely to be socially influenced, easy to administer, and relatively low costs.
- *Cons* – Information transferred via the Internet may not be confidential; poor control over respondent selection; follow-up difficult to conduct; difficult to obtain probability sample; and, like mail surveys, this is the most difficult type of questionnaire to design.¹⁰⁹

E. SURVEY QUESTIONNAIRE DESIGN

The survey questionnaire should be designed to include elements which make the survey pertinent and relevant to the population to be sampled, thereby maximizing response rates and minimizing error or bias.

Components

The following sections normally comprise a questionnaire:

- *Request for cooperation* – This might be a brief introductory paragraph (or speech) at the beginning or could be a comprehensive cover letter. It should highlight the reason for the survey, voluntary participation, confidentiality, and willingness to provide a copy of results to respondents if desired.
- *Instructions* – Always simple, clear, and repetitive where necessary. Keep to a minimum and make sure they are easy to administer if given by an interviewer.
- *Actual questions* – See sections on question content and question formats.
- *Classification data* – Normally these are demographic information and respondent characteristics to ensure the target population has been sampled adequately.
- *Identification data* – This may include names, addresses, and telephone numbers and/or identification numbers of participants to keep track of respondents and to facilitate follow-up procedures.

General Layout

¹⁰⁹ "Survey Questionnaire Design", Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

The layout of a written questionnaire can have as much to do with response and error rates as do the actual questions. Therefore, the following factors need to be carefully addressed:

- *Length* – All surveys should be as brief as possible. Mail and telephone surveys should be no longer than 10 to 15 minutes. Personal interviews should not extend beyond 30 minutes.
- *Appearance* – Mail and Internet surveys should give the appearance that they will be easy to complete. Neat, orderly written questionnaires with a lot of white space will increase response rates.
- *Instructions* – Clear, unambiguous, and easily readable instructions work best. In mail and Internet surveys, it helps to offset instructions from the rest of the text.
- *Vertical flow* – Logical question and section sequencing is critical. Avoid jumping from topic to topic. Cluster similar types of questions either by subject, type of response, and/or instruction.
- *Numbering sequence* – Precoding every item on the questionnaire allows for ease of data entry. However, coding must be done discretely if it is to appear on all but the master copy of a written survey to avoid confusing respondents.
- *Transition statements* – When shifting topics and/or sections in the questionnaire, clear and understandable transition elements or statements are important.¹¹⁰

F. QUESTION CONTENT

The following factors must be considered when constructing the questions to be used in the survey instrument:

- Will the question elicit the type of response desired? For example, “How long have you lived in your current home?” An open-ended question of this type may elicit answers such as “all my life,” instead of number of years.
- Use words which are simple, familiar, and unambiguous to the target population. Do not use colloquialisms or slang. A fifth grade reading level should be used when constructing questions. The question “Which detrimental attributes impact on our transportation system?” contains words that are too difficult. The question “What do kids in your neighborhood do for fun?” is vague and contains slang. ‘Kids’ does not define a specific age group and can refer to young goats.

¹¹⁰ “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

- This principal harkens back to the important lessons learned from any sound business communications course. The use of high-impact, bottom-lined speech is critical to ensure your survey questions are relayed to the respondent clearly and understandably.
- Avoid double-barrel questions (i.e. a question that contains two separate questions). For example, the question “Do you support smoking policies in private industry, but not in governmental offices?” is two separate questions.
- Determine whether respondents will be able to answer accurately; are they likely to know, understand, and/or remember items relating to the desired information? Respondent recall becomes unreliable quickly. Structure questions to assist memory by measuring a discrete and recent time period rather than a vague reference to the past.
- Avoid questions containing double negatives or phrases such as, “would you agree or disagree that...” These types of questions confuse respondents who may not correctly interpret the intended meaning.
- Is the person answering the question the appropriate person?
- Will the respondent be willing to answer certain types of questions truthfully? Some topics regularly elicit biased responses or higher item nonresponse. These topics include information relating to income, or criminal and other kinds of personal behaviors.
- Does the question bias the respondent’s answer? For example: “The president believes Social Security should be privatized to protect the funds. Do you agree?” If this appeared on a survey, the answers might reflect feelings about the president rather than what should be done with Social Security.
- Questions which appear to be “off the wall” and unrelated to the subject matter being explored should be avoided. The questions should provide the information needed as defined in the survey objectives and purpose.
- The first question is important and should be short, simple, and relevant. More complex issues can come later in the questionnaire. This will ensure higher response rates.
- In multiple-choice or close-ended questions, make sure all possible response choices are included and are mutually exclusive. When asking the number of times something has occurred, it is not unusual for the answer choice “none” or “0” to be missing.¹¹¹

¹¹¹ “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

G. QUESTION FORMATS

There are five basic formats from which to structure questions in a survey instrument:

- *Open-ended*: “The job tasks I enjoy most are _____.”
- *Modified open-ended*: “I was ____ years old when I began my current job.”
- *Closed-ended with ordered response choices*: “How would you rate your preferences for the following job tasks?” (circle one answer for each item):

ANSWER CHOICES

<u>Writing</u>	Enjoy	Neutral	Dislike
<u>Editing</u>	Enjoy	Neutral	Dislike
<u>Organizing</u>	Enjoy	Neutral	Dislike

- *Closed-ended with unordered response choices*: “Which of the following job tasks do you like the most?” (circle one letter)
 - Writing
 - Editing
 - Organizing
- *Partially close-ended*: “Which job task do you most enjoy doing?” (circle one letter)
 - Writing
 - Editing
 - Organizing
 - Other (please specify) _____

In general, close-ended with ordered or unordered response choices are the easiest to code for data processing. Open-ended are the most difficult. However, all question types can be useful depending upon what is being measured (behaviors, attitudes, etc.) and the kinds of information needed.¹¹²

¹¹² “Survey Questionnaire Design”, Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

H. PRETEST

The last steps before actual distribution of the questionnaire include:

- A review by colleagues and potential data users, and
- A pretest of the survey instrument to be used.

For comprehensive pretesting, a mock copy should be submitted to a representative cross-sample of the population to be surveyed. Some preliminary data analysis (even if hand calculated) should be attempted to check both design and coding procedures. It often is useful to run two or more versions of the questionnaire to determine which version will do the best job. This may include variations on questions.

In general, a pretest is administered to ensure:

- Ease of administration of the survey,
- Field processes to be employed work smoothly,
- Questions are easily understood,
- All important questions have been asked, and
- Instructions are understood.¹¹³

I. SUMMARY

Performing a stakeholder value assessment is a critical tool to be employed by the organizational decision-making body. A stakeholder survey is the vehicle by which this task is accomplished. Due to the magnitude of importance that this survey represents in terms of potential decision outcomes, adequate design and distribution of this survey is vital to ensure the desired feedback necessary to make a timely, wise decision is collected. As discussed, there are multiple elements for consideration throughout the survey design and distribution process, each of which will shade the survey appearance and answers solicited differently. The end responses from this survey provide a useful collective of information from which the organizational decision-making body may glean the relevant value weights that identify the programs upon which the stakeholder body places the most importance.¹¹⁴

¹¹³ "Survey Questionnaire Design", Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

¹¹⁴ "Survey Questionnaire Design", Fairfax County Department of Systems Management for Human Services, April 2003, pp 1-8.

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VIII. SURVEY RESULTS AND INTERPRETATION

A. INTRODUCTION

In the previous chapter we discussed the methods used to survey a group of stakeholders, and how to design it to enable it to achieve the desired result. In this chapter, we will discuss the survey process in regards to how it was applied to determine the value assessments of services to the various stakeholder groups at NPS.

This chapter is designed to provide a comprehensive analysis of the results of our data, how that data is interpreted, and the actions that can be taken based on that data. For that reason, some of the discussion may seem redundant, but it is required to tie everything together.

B. METHOD OF SURVEY SELECTED FOR NPS SERVICES ANALYSIS

We constructed our survey questionnaire based on proposed areas for reduction in the services budgets of the Naval Postgraduate School (NPS) in Monterey, California. These proposals were identified as potential cost saving areas through suggestions from all stakeholder groups. The list that we used to compile the survey was in no way comprehensive for all possible areas to save costs, but gave a basis for commencing the data collection portion of the study. The survey was provided to the Naval Postgraduate School stakeholder community, composed of NPS faculty, staff, and the student body. We decided that the best approach for our particular application was to create a web-based survey. We found that the web-based survey offered the following advantages:

- Relatively easy to construct.
- Most effective and efficient medium to reach the widest distribution.
- Lowest cost alternative.
- Provided the greatest speed in delivery and data feedback.
- Easy and convenient for the respondents to use. They could logon to the survey web-site and take the survey at their convenience.
- Gave us immediate updates as to the total number of respondents, current data trends, and automatic data analysis.

We found that a web-based survey was relatively easy to build and design. Understandability is dependent on the survey author's experience and level of computer software expertise, an Internet-based survey can be among the easiest to prepare. Not only does modern survey software make the design process highly intuitive, it virtually makes the construction and layout features seamless. There are a number of professional online survey companies available, some offering usable free services and others offering premium services for a subscription fee. Depending upon your research budget, a service designed to meet your individual needs is surely available.

C. METHODOLOGY OF THE NPS SURVEY DESIGN

The most challenging dilemma we encountered throughout the overall survey construction process was delicately manipulating the survey question phraseology so as to avoid unintentionally weaving our own personal biases into the actual questions. Bias can find itself taking many forms; the most plausible is the survey developers injecting personal opinions and/or biases within the question itself. If a survey developer has a preconceived notion of the outcome of the data collection; it is possible to unconsciously inject that bias into the questions. This might prejudice how the respondent reads and responds to a particular question. By doing this, we may arouse thoughts or opinions within the respondent that were not there originally and therefore influenced how they answered the survey question. A more subtle form that survey question bias could take happens when the available responses for each question are too limited. If a respondent's preferred choice for a question is not offered as a potential answer, they are forced to either not answer the question or give a response that doesn't accurately reflected their opinion.

It is difficult, and some would argue not possible, to design a completely unbiased survey. Through multiple revisions and painstaking analysis of the questions that we asked and the potential answers that we offered, we tried to minimize these biases by designing a survey that presented facts only, without representing an opinion of any form. Here were the guidelines that we followed:

- Provide an explanation of the intent of the survey. To reduce bias in answers, make sure that the respondents understand: why the survey is being given, why it is important for them to respond, and what will be done with the data collected.
- Limit the number of questions to those required to gather accurate data. Too many questions will detract from the respondent's desire to take the survey, and too few will limit the amount of data that you collect.
- Provide as much information as possible to explain the question. Too much information can confuse the respondent, and too little information makes the question too vague.
- Construct all of the responses to be similar in nature. Consistency in answers allows the respondent to easier identify relative value. In our survey, we had the respondent rate the answers, using a scale from 1 to 5, based on how much importance or value was placed upon varying services provided to NPS. This accomplished two things: 1) maintained uniformity of answers among respondents without introducing biases, and 2) provided us a value-scale of responses that lent themselves to easier data analysis.
- Have your survey reviewed by members of each stakeholder group. This will ensure the intent of the survey is understood, and that it is comprehensive enough to collect good data.
- Have your survey reviewed for content. The last thing desired by a team conducting a study is to create hostility as a result of the questions asked in the survey. If the respondents, particularly members of the Chain of Command, or any other external stakeholder, perceive a jaded tint or underlying bias with respect to the goal of the survey, then the survey may be more detrimental than beneficial.
- In our study at NPS, we had the survey reviewed by Public Works Center (PWC), Military Staff, Faculty, and Student representatives to ensure that our survey was within these guidelines.
- Include an option for comments. This is critical to all surveys. This gives the respondent an opportunity to give other insights to the problem that may have crossed their minds while answering the questions. Additionally, it can provide more completeness to their answers for specific questions. The goal of our survey was to find ideas for cost savings, and through the comments sections, there were excellent opinions that may give options for future costs savings.

D. REQUIREMENTS FOR CONDUCTING THE SURVEY

There are steps that must be accomplished to ensure that the survey process proceeds smoothly. The base may have a required survey type that it prefers, and it is in the best interest of the developers to ensure that is used. There are numerous survey tools

available; some better suited for various types of surveys, so it is strongly encouraged that the survey method selection is a) consistent with the data collection desired, and; b) consistent with the requirements of the base.

In the NPS services study the hosting service for the web-based survey was provided by surveymonkey.com. This is the service subscribed to by the NPS Research Department. Prior to electronically publishing our survey and making it available to the NPS community, we had to:

- Obtain Independent Review Board (IRB) approval of our survey content and overall intent.
- Agree to specific conditions and restrictions designed to protect the individual rights and privacy of potential respondents.
- Once cleared, make our survey available to the NPS community.
- Advertise the existence of our survey by soliciting respondents via e-mail as well as announcements on the NPS intranet web pages.

A copy of the final version of our survey is enclosed as APPENDIX A, with the raw survey results enclosed as APPENDIX B.

E. SURVEY RESPONDENT INFORMATION

The population of surveyed stakeholders is approximately 2400, broken down to the following demographic categories: 1700 Students, 350 Faculty (not the total number of faculty on campus, but those available during the time period of the survey), and 200 Military Staff. There is no way to adequately tell if all members of that population were aware of, or had the opportunity to participate in the survey. The amount of responses indicated that the topic of potential changes in the base services was important to the NPS community. Table 9 represents the NPS stakeholder population of staff, faculty, and students and the survey response rates:

Stakeholder Group	Number in Population	Number of Responses	Percentage of Respondents
Staff	200	25	12.5
Faculty	350	19	5.4
Students	1700	365	21.5

Table 9. NPS Stakeholder Population By Category

Of the approximately 2250 NPS stakeholders available during the survey timeframe, 409 contributed to the survey for a response rate of 17 percent. For this survey, exposure was limited to the intranet web daily announcement page, and emails distributed amongst the faculty and staff which request participation. It would be optimum if all sample sizes met the criteria of a normal distribution (sample size of 30); however in this case we were forced to assess the data with two groups in a non-normal distribution. While there is no actual data maintained to compare survey response rates among surveys at NPS, the response to this survey in terms of numbers of people who participated was 50-70 percent higher than other surveys conducted during the last six months.¹¹⁵ The following paragraphs discuss the breakdown of the student population in terms of experience and rank. Staff and Faculty are not reduced further in detail as their stakeholder groups are much smaller in comparison.

As Figure 3 illustrates, the bulk of the survey respondents were students, as would be expected given the fact that students comprise the vast majority of personnel stationed at NPS.

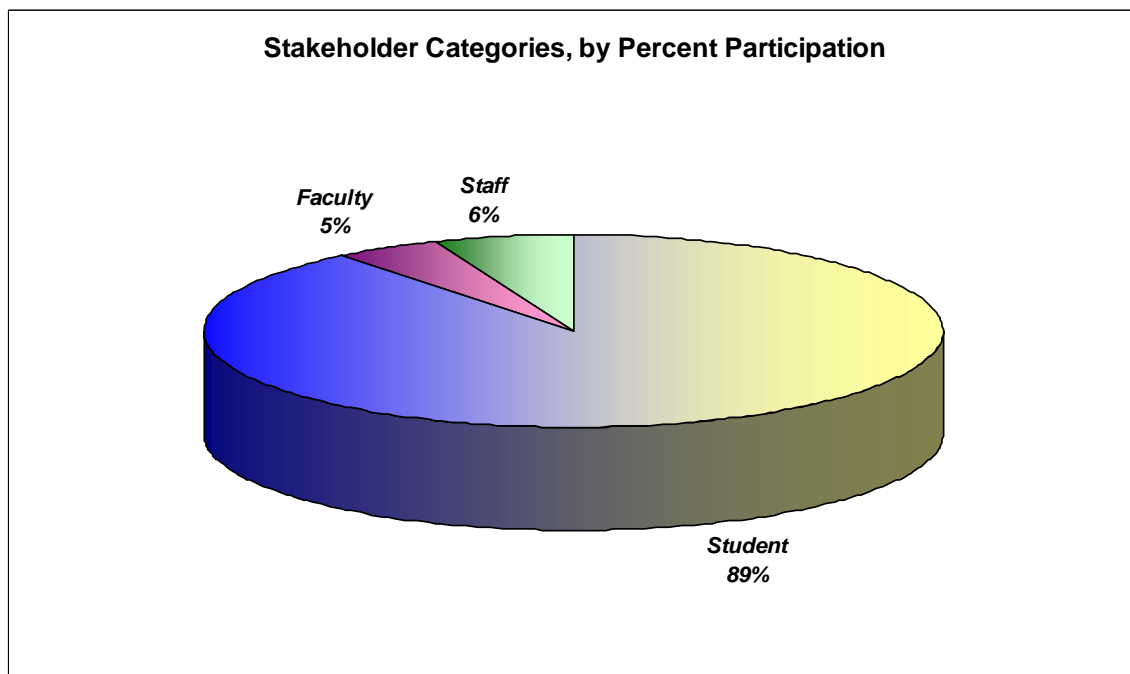


Figure 3. Stakeholder Participation by Category (Percent Of Total Respondents)

¹¹⁵ Comparison of NPS survey respondent levels from January to July 2006.

Figure 4 illustrates that the vast majority of students are active duty.

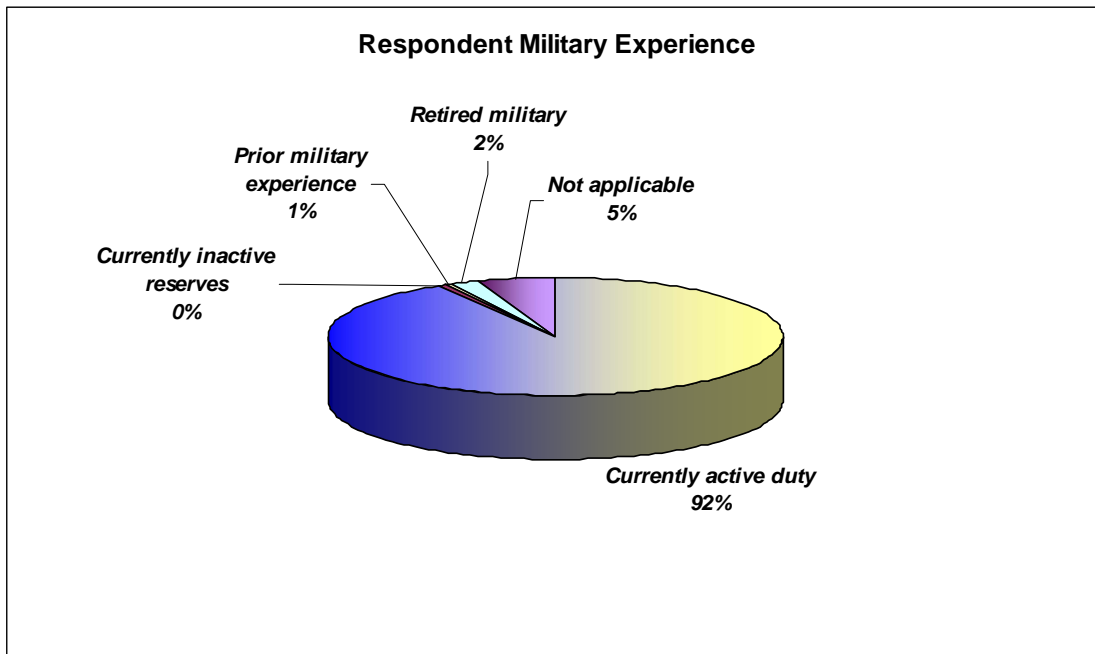


Figure 4. Respondent Military Experience (Percent Of Total Respondents)

In a further breakdown of students, we note in figure 5 that the bulk of survey respondents were Naval Officers, as is expected due to the predominance of Naval Officers as a percentage of the total student population. Figure 6 breaks down the student population by military paygrade.

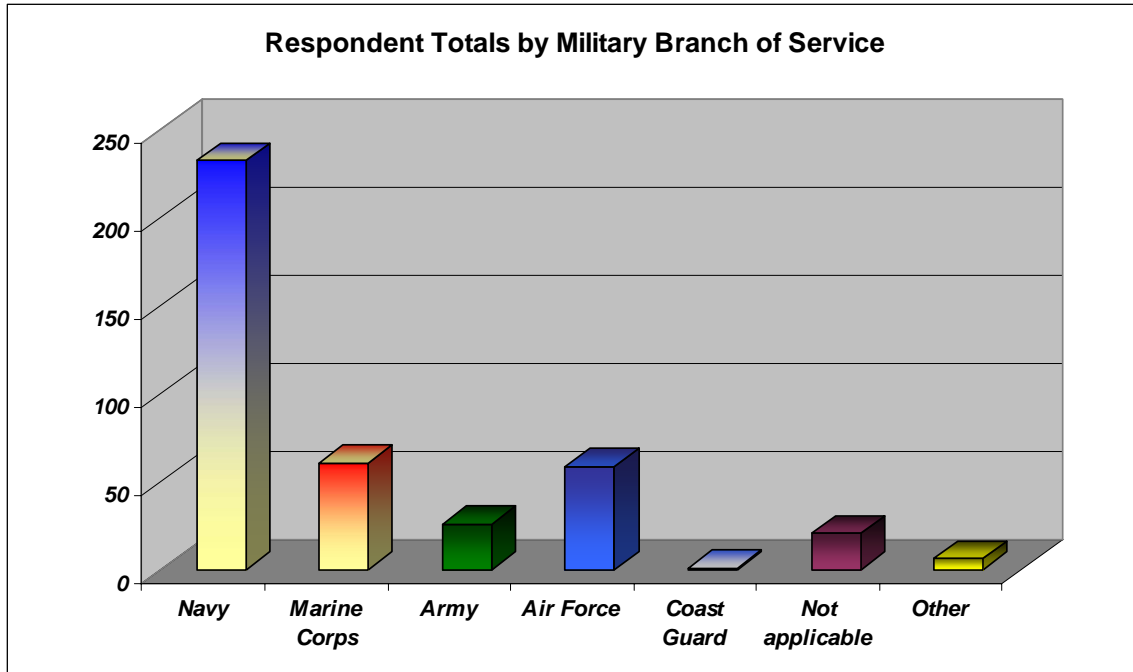


Figure 5. Respondent Totals by Military Branch of Service.

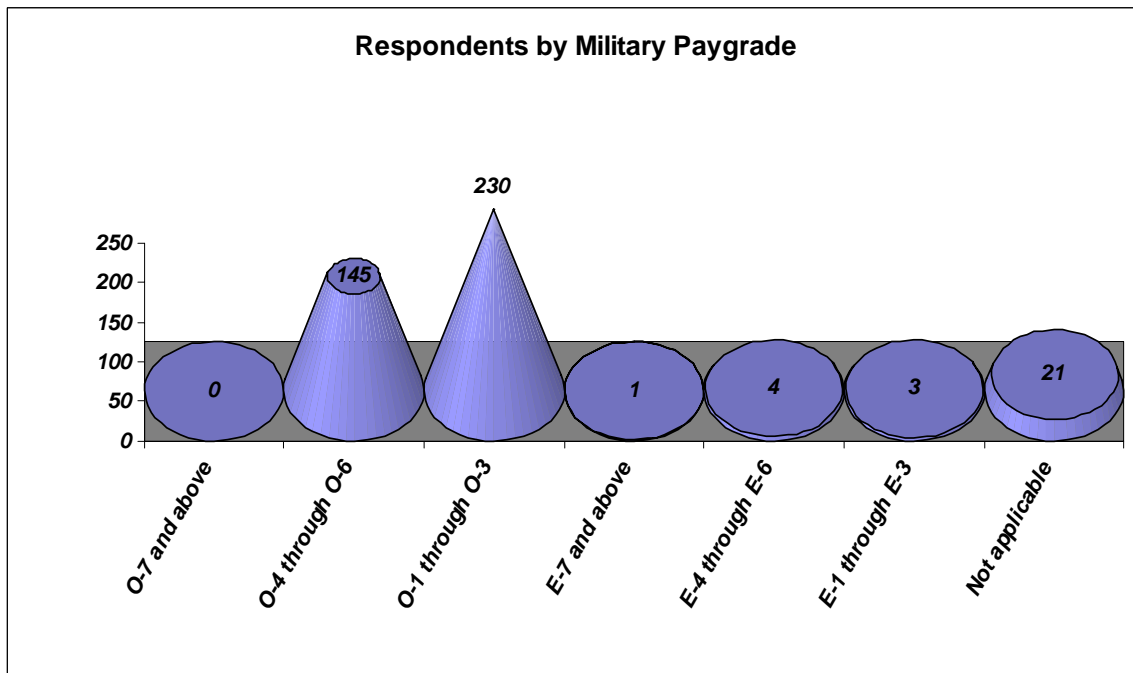


Figure 6. Respondents by Military Paygrade

Therefore, based upon the information we have gathered, we may accurately note that the bulk of our survey respondents were active-duty Naval Officer students between the paygrades of O-1 through O-3, with the next most abundant group being active-duty

Naval Officer students between the paygrades of O-4 through O-6. Capturing and assessing respondent military experience, branch of service, and paygrade is significant in aiding us, as the survey data evaluators, in identifying any noteworthy trends in value assessment among groups of similar rank, military experience, and/or branch of service spanning the three stakeholder categories.

F. USING THE SURVEY RESULTS

Enclosed as APPENDIX B are the respondent results from our survey. Of note, the survey software provided by surveymonkey.com tabulates response data into usable analytical format. For example, for each survey question, responses for each category are totaled and a weighted average is automatically performed. This allows us to determine the area upon which respondents place the most value or importance at a glance.

The data needs to be taken from this format and further manipulated to develop a weighted average. This average will help establish a relative measure of value using the techniques discussed in CHAPTER IV. Once all categories of services are put in to relative measures, the weighted averages can be used to develop strategies to decide which services to cut.

G. USING THE COMMENTS SECTION

Almost half of the respondents provided amplifying comments to the questions in the survey, and additional comments that were valuable for other strategic considerations. While this data is not directly incorporated in the recommendations provided later in this section, it is an excellent source of qualitative information to be provided to the decision makers. It is recommended that those comments be maintained and provided in raw format to prevent any further biases in the sharing of the survey results.

H. DEVELOPING THE WEIGHTED AVERAGE

When analyzing the data, it is important to separate it into categories that can be measured both quantitatively and qualitatively. Again, we reference CHAPTER IV (Assessing Values of Non-tangible Items) to interpret the data and formulate a plausible conclusion. The numbers themselves will not always provide the needed answers, so it is important to break them down into categories that can be explained qualitatively as well.

If we took an average of all answers to a particular question and used that as an average, it would minimize the reasons why a stakeholder group as a whole assessed value in a certain measure. For example:

- Janitorial services; a student with no office would assess the value of someone taking out trash on a routine basis differently than a staff or faculty member with an office.
- A staff member that doesn't use the same areas that students use may not value the grounds keeping in that area the same as a student.
- A student who had been at the school for two years may have a different value for the level of pest control than a student on board for only two months.

Potential responses were based on a Likert scale ranging from '1' to '5'. This scale measured the level of importance the respondent places upon a given service, with an answer of '1' representing little to no importance and an answer of '5' representing great importance. The more weight or importance that the respondent places upon a given service, the higher its average point total will be and hence the greater value that this service represents to the majority of respondents. To be more specific, our method was:

- Take the sum of the raw scores (answered from 1 – 5) from each question and divide that value by the number of respondents. This will give an overall average for that specific question.
- Decomposing that average further into respondents by group using the same mathematical calculations will give an average by stakeholder group. That can be further refined into averages based on rank, time in-service, and other categories. This allows for more qualitative analysis of the weighted average.
- There were different amounts of questions for the various services categories: janitorial, pest/animal control, and grounds maintenance. This allowed us to further refine each of the categories based on complexity (e.g. there are four distinct levels of grounds maintenance), and develop a more precise weighted average.

Decision makers could then use these weighted averages to develop a priority scheme to decide which services to decrease or eliminate in order of decreasing value to the stakeholder. This information helps in this regard, but is merely one tool for consideration in order to make a fully-informed, strategic decision with respect to service contract reduction.

I. ASSESSING A SERVICE AS CRITICAL OR NON-CRITICAL

Before decreasing the level of service for a specific category, the decision makers must assess the impact of overall strategy. If a decrease in a specific service will cause material degradation to a structure, a health hazard, or a safety hazard then the service must be considered as critical. If assessed as critical, any decreases to the level of service provided must be closely monitored. It must be remembered when analyzing survey data, that even though a particular service may not rate high on a scale of relative value, it may in fact be a critical service, that can not be decreased.

If a service is not assessed as critical, then it should be considered as ‘low-hanging fruit’ for decreasing service costs. However, just because the service is non-critical at this point, excessive cuts to the services could cause problems in the future which could be undetected in the short term. For example, if grounds maintenance around a specific building is decreased initially there may be no immediate effect, but further decreases in grounds maintenance could cause root problems, blowing debris, or potential tree limb damage. In other words, each time a service level is decreased, the same questions to determine whether the service is critical or non-critical should be asked.

The services that pass the test to be non-critical are then assessed for relative value to the stakeholder. These services that are readily and easily cut from the budget with no significant impact upon normal daily base operations are those that should be identified as primary areas for service reductions.

J. SERVICE CATEGORIES AND RELATIVE VALUES DETERMINED BY THE SURVEY

This section describes the actual service categories that were part of the survey, and how that particular service is valued by the stakeholders. That value will then be used to develop a strategy for decreasing service levels. All weighted average data for each service is in terms of a range of 1 – 5. ‘1’ indicates low value assessment and ‘5’ indicates high value assessment. The next section will examine comparisons in relative ranking of importance among the stakeholder groups.

1. Animal Control: (One Question on the Survey)

Service: NPS currently pays \$12,000 annually to control the goose population on campus through the use of specially trained canines. The intent of the service is to reduce the amount of geese droppings around those areas of campus most frequented by pedestrian foot traffic.

Criticality Factors: Sanitation, health issues, base aesthetics.

Assessment: Non – Critical Service.

Amount of Respondents: 100%.

Overall Weighted Average: 2.73

Weighted Average by Stakeholder Group:

- Faculty – 2.79
- Staff – 2.95
- Student – 2.45

2. Pest Control: (One Primary Question, One Supporting Question on the Survey)

Issue: NPS currently pays \$20,000 annually for general pest control services. The intent of the service is geared towards the control of insects (pests) such as ants, cockroaches, spiders, etc. within NPS facilities. The questions discuss the effectiveness of the existing service.

Criticality Factors: Sanitation, health issues.

Assessment: Semi – Critical Service. Service could become critical for sanitation/health issues if uncontrollable insect infestations occur.

Amount of Respondents: 100%.

Overall Weighted Average: 3.93

Weighted Average by Stakeholder Group:

- Faculty – 3.76
- Staff – 4.00
- Student – 3.96

3. Grounds Maintenance: General (Two Questions)

Issue: NPS is responsible for the grounds maintenance of approximately 51.2 acres of land. This area encompasses the NPS campus, Fleet Numerical Meteorology & Oceanography Center, and Teen/Child Development Centers. NPS itemizes the level of maintenance performed to these areas into four categories listed in order of decreasing care requirements and cost: Prestige (highest level of service), Improved, Semi-Improved, and Unimproved (no service).

Criticality Factors: base aesthetics, debris hazard, noxious weed control.

Assessment: Critical service for prestige and improved areas. Non – critical service for anything below “improved” areas.

Amount of Respondents: 100%

Overall Weighted Average: 3.48

Weighted Average by Stakeholder Group:

- Faculty – 3.80
- Staff – 3.56
- Student – 3.06

4. Grounds Maintenance: La Mesa Baseball Field (One Question)

Issue: NPS conducts grounds maintenance intended to maintain the La Mesa Baseball Field. Annual cost is \$15,000.

Criticality Factors: base aesthetics, MWR for users

Assessment: Non – Critical Service. Baseball field is only used by local stakeholders. This critically assessment is only based on its long term impact in consideration of earlier discussion. Users of this area would certainly assess this service with more importance.

Amount of Respondents: 100%

Overall Weighted Average: 2.29

Weighted Average by Stakeholder Group:

- Faculty – 2.14
- Staff – 2.32
- Student – 2.41

5. Custodial Services: General (Five Questions)

Issue: NPS spends approximately \$1.152 million annually for custodial services. Presently, custodial services are provided for office spaces, classrooms, labs, study and conference rooms, and common “lounge” areas within all NPS facilities. The existing contract also provides standard custodial service for most common facilities on the NPS campus including: Teen Center, Child Development Center, Base Gym and Bath House, and King and Melville auditoriums.

Criticality Factors: Sanitation, health issues, pest control issues, base aesthetics

Assessment: Semi – Critical Service. Significant reductions in service would cause long term degradation of facilities and could result in health and safety issues.

a. Custodial Services: Office Trash Removal

Criticality Factors: Sanitation, health issues, pest control issues, building aesthetics.

Assessment: Semi – Critical Service. Significant reductions in service would cause long term degradation of facilities and could result in health and safety issues.

Amount of Respondents: 100%

Overall Weighted Average: 2.8

Weighted Average by Stakeholder Group:

- Faculty – 3.12
- Staff – 2.93
- Student – 2.36

b. Custodial Services: Office Floor Cleaning

Criticality Factors: Sanitation, health issues, pest control issues, building aesthetics.

Assessment: Non – Critical Service. Significant reductions in service could cause long term degradation of facilities and could result in health and safety issues.

Amount of Respondents: 100%

Overall Weighted Average: 3.4

Weighted Average by Stakeholder Group:

- Faculty – 3.80
- Staff – 3.10
- Student – 3.31

c. Custodial Services: Chalkboard/Whiteboard Cleaning

Criticality Factors: Classroom/Conference room aesthetics.

Assessment: Non – Critical Service. Total reduction would require transfer to stakeholders to prevent aesthetic decline.

Amount of Respondents: 100%

Overall Weighted Average: 1.78

Weighted Average by Stakeholder Group:

- Faculty – 1.83
- Staff – 1.72
- Student – 1.80

d. Custodial Services: Classroom/Trash Removal

Criticality Factors: Classroom/Conference room aesthetics.

Assessment: Non – Critical Service. Total reduction would require transfer to stakeholders to prevent aesthetic decline.

Amount of Respondents: 100%

Overall Weighted Average: 2.00

Weighted Average by Stakeholder Group:

- Faculty – 2.04
- Staff – 1.96
- Student – 2.01

e. Custodial Services: Classroom Trash Removal

Criticality Factors: Classroom/Conference room aesthetics.

Assessment: Semi – Critical Service. Total reduction would require transfer to stakeholders to prevent aesthetic decline.

Amount of Respondents: 100%

Overall Weighted Average: 2.79

Weighted Average by Stakeholder Group:

- Faculty – 3.14
- Staff – 2.46
- Student – 2.77

6. Custodial Services: Low Use Restroom Cleaning (One Question)

Issue: NPS currently provides cleaning services for all restrooms. The intent of this decrease is to identify "low-use" restrooms, to allow decreased periodicity of cleaning. At the time of the study, the exact criterion by which restrooms may be deemed "low-use" has not been finalized. All restrooms under consideration for this category would still receive basic daily service to ensure all required levels of “necessary” products will be maintained. The “estimated” cost savings for NPS could be \$100K annually.

Criticality Factors: Sanitation, health issues, base aesthetics.

Assessment: Non – Critical Service.

Amount of Respondents: 100%

Overall Weighted Average: 3.18

Weighted Average by Stakeholder Group:

- Faculty – 3.10
- Staff – 3.30
- Student – 3.12

7. Volunteerism: Stakeholder “Willingness to Help”

Custodial Services: Faculty/Student/Staff willingness to perform certain tasks (Two questions).

Issue: This section determines the stakeholder willingness to transfer responsibility for some of the current custodial services. These values reflect the average “willingness” of the stakeholders to allow transference of responsibility from PWC to them for the follow: Chalkboard/Whiteboard Cleaning and classroom trash removal.

Note: While significant cost savings could be realized, it is incumbent that any savings are documented to capture the true value of services required to run the base. This is covered under the “Volunteerism” section in CHAPTER IV.

Criticality Factors: Sanitation, health issues, pest control issues, base aesthetics, stakeholders willingness to adopt these duties, and the ability of the stakeholders to enforce adequate levels of service.

Assessment: Semi – Critical Service. Significant reductions in service would cause long term degradation of facilities and could result in health and safety issues.

Amount of Respondents: 100%

Overall Weighted Average: 2.16

Weighted Average by Stakeholder Group:

- Faculty – 1.13
- Staff - 1.70
- Student – 3.66

K. SERVICES REDUCTION STRATEGY

Based on the weighted average in the previous section, recommendations for decreasing funding for services is developed by beginning with those services that have

the least comparative value. Targeted reduction/elimination values are based on relative standing of values in assessed by various stakeholder groups. Assessment on elimination or reduction in the service category was based on the following:

		<i>Unweighted Raw Averages</i>	<i>Combined Weighted Averages</i>	<i>Weighted Staff Averages</i>	<i>Weighted Faculty Averages</i>	<i>Weighted Student Averages</i>
1	Retain Goose Dropping Control?	8	8	6	8	9
2	Retain General Pest Control?	1	1	1	1	1
3	Retain 'Prestige' Services?	5	3	3	2	5
4	Retain 'Improved' Services?	3	2	2	4	3
5	Retain Ball field Services?	11	10	10	10	8
6	Retain Office Trash Removal?	7	6	7	6	11
7	Retain Office Floor Cleaning?	6	4	5	3	2
8	Retain Chalkboard Cleaning?	12	12	12	11	10
9	Retain Dry-Erase Board Cleaning?	10	11	11	12	12
10	Retain Class Trash Removal?	4	7	8	5	6
11	Retain Class Floor Cleaning?	9	9	9	9	7
12	Retain L.U. Restroom Clean?	2	5	4	7	4

Table 10. Stakeholder Assessment of Service Valuation

Note: This is based on the multiple stakeholders listing the service as priority “eight or lower” in matrix of assessed relative value. Decision makers must still consider criticality factors previously mentioned.

L. SERVICES TARGETED FOR ELIMINATION

1. Goose Control: Eliminate

Realized cost savings: 15,000

2. Grounds Maintenance (La Mesa Ball Field): Eliminate

Instead of maintaining that area, encourage self help maintenance of the field by users.

Realized Cost Savings: 15,000

Note: all projects that use stakeholder efforts must be valued and captured in the volunteering section of all reports.

3. Custodial Services (Transferring Selected Duties to Staff/Faculty/Student):

Adopt, if required to meet target funding levels). Strategy: use a minimally invasive strategy to shift only those requirements to stakeholders that will decrease costs. For example: Whiteboard, Blackboard cleaning, followed by trash removal.

Realized Cost Savings: Varies. Cost per square foot * square footage eliminated.

Stakeholder Assessment: Medium Value – Target for Reduction

Note: This is based on the multiple stakeholders listing the service as priority “four through seven” in matrix of assessed relative value. Decision makers must still consider criticality factors previously mentioned.

M. SERVICES TARGETED FOR REDUCTION

1. Grounds Maintenance (General): Reduce

Decrease overall funding. At a rate commensurate with the type of category of acreage * acreage downgraded (or eliminated), reduce maintenance by similar increments. Strategy: Leave Prestige areas in tact, with no change. Take measures to reduce common academic areas as much as possible, by promoting “self help” projects that are designed to use native habitat plants which will transfer improved grounds to semi-improved, and existing semi improved grounds to unimproved.

Required Cost Savings: Varies. Computable based on acreage service adjustment * old cost per acre minus new cost per acre.

Note: all projects that use stakeholder efforts must be valued and captured in the volunteering section of all reports.

2. Custodial Services (General): Reduce

Decrease overall funding by desired amount. Computed as cost per square foot * square footage reduced (or eliminated) of building space, reduce custodial services areas in the same fashion. Strategy: Identify remote/low use buildings that have existing contracts for custodial services, and decrease level of service in least commonly used areas first. Then identify building usage priorities to identify further reductions.

Required Cost Savings: Varies. Computable based on acreage service adjustment
* old cost per acre minus new cost per acre.

Note: all projects that use stakeholder efforts must be valued and captured in the volunteering section of all reports.

Stakeholder Assessment: High Value – Consider Carefully for Reduction.

3. Pest Control: Reduce

Decrease overall funding by desired amount. Reduce at a rate of cost per sq. ft. of coverage * number of square feet reduced (or eliminated). Strategy: decrease remote/low use buildings first, then from low priority to high priority buildings.

Required Cost savings: Varies. Computable based on square footage treated * old cost per square foot minus new cost per square foot.

Enclosed as APPENDIX C is a service contracts reduction solution generated using the Crystal Ball software function in Microsoft Excel, illustrating an alternate method of determining which services to keep/cut as per assigned value assessments.¹¹⁶

Enclosed as APPENDIX D is service contract valuation data as used by Naval Region Southwest.

¹¹⁶ Barnum, Usher L., CDR/USN, Rob Collins, LT/USN, Carrissa Ibbott, CAPT/Australian Army, and Terrance Jones, LT/USN, Naval Postgraduate School, Monterey, CA, September 2005.

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IX. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

The previous chapters have presented methods and best business practices to identify the base's stakeholders, methods to increase internal efficiencies, and ways to measure intangible items and assess their values. This study has wide ranging application potential with other Navy Regions and installations. By incorporating these methods in an analysis of how to best fund base services; the impact of the reduction of services due to decreased fiscal resources can be minimized. More specifically, how to assign 'value' from which leadership may make judgment decisions as to which services to cut. This final chapter presents our conclusions and lessons learned in trying to develop a business-based strategy to execute Public Works Command's (PWC) ability to effectively fund services.

B. CONCLUSIONS

At the beginning of our project we had the grandiose vision of developing an exact business-based case to reduce expenditures of base services by \$529,000. As the project progressed we confronted the intricacies of the Public Works organization, and services contracts in general. This refined our scope and led us to identify the various stakeholders and assess how they valued the services provided by PWC. By capturing this perspective we were able to develop a strategy to cut costs based on examination of those results. By comparing the relative values, it was possible to assess areas that should be weighed more heavily in the decision to terminate a service or reduce the level of service to a particular threshold.

If objective and measured ranking systems are not used, inefficiencies in applying scarce resources will be prevalent. The focus should always be on devoting funding to services that give the stakeholder the greatest value for their committed resources. It is easy to use a generic 'peanut butter' spread solution and just take money from all service categories in equal percentages or amounts. However, that merely degrades all services without due consideration to the potential impacts of those cuts.

While researching our topic we kept revisiting two key themes: a) that an organization must increase efficiency internally and develop a long term plan to execute its budget; and b) that running a base is very similar to running a city. We then compared the services executed on this base with the services provided by city/base managers across the country; because logically, many of the constraints and goals are similar. This means that the success stories that apply in the city management segment of the economy are applicable to a military base.

This project highlighted inefficiencies throughout the PWC organization; not attributed to the members of this organization, but inherent to any organization that is charged with providing services for a base. We could easily project cost figures to assess strategies to meet targeted fiscal constraints, but that is a band aid solution for a systemic problem. Efficiencies have to be gained internally and externally to the organization. Every level of the organization and aspect of services from an internal and external vantage point requires analysis. Available resources must be managed effectively to meet production requirements. Contracts must be negotiated and executed properly. Stakeholders must understand the services that they are receiving and understand their importance in being good users of those services. Failing to examine these levels and many more lead to inefficiencies in the system. The project identified the need:

- For PWC to use objective criteria to prioritize and fund those services that provide the most relative benefit to the stakeholder.
- For NAVREG to provide all applicable support to the bases under their jurisdiction in establishing performance measures and incorporating best business practices from the region and throughout the country. The end goal is the same; saving and offering more efficient use of available funds.
- For PWC to have the latest and most current software to manage their processes. This must be accompanied with the requisite training to ensure that the system is used effectively.
- For the base to use the vast amount of organic academic expertise to assist PWC to continue to gain efficiencies through incorporating performance measures throughout all levels of their organization.
- To keep the stakeholders involved in the process at all feasible points. All interested parties must be surveyed to garner their input.

- To report the goals and results of the PWC organization; highlighting successes and gained efficiencies.
- To make this a team effort. The problem is too big and complex for an organization to effectively resolve; because there is no single resolution. This is an ongoing battle to maximize utility to the stakeholder given the constraints of fiscal realities. By focusing on the team, all stakeholders; internal and external can ease the problem and be a part of the solution.

C. RECOMMENDATIONS FOR FUTURE RESEARCH

We suggest further research in the following areas:

- Implementing Performance Measurement Systems into the Public Works organization.
- Further cost savings strategies and measures for base facilities.
- An evaluation of funding levels for bases in NAVREG structure.
- A study into the Most Efficient Organization (MEO) comparison between bases.
- Manpower utilization in the PWC; how to maximize efficiency.
- Contract negotiation, development, and execution for PWC activities.
- Organizational behavior; how to develop effective support mechanisms for bases under the cognizance of NAVREG South West.

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APPENDIX A. NPS PWC SERVICE CONTRACTS VALUE DETERMINATION SURVEY

<http://www.surveymonkey.com/s.asp?u=859381239093>

Thank you for taking the time to share with us your valued opinions and recommendations. This survey consists of 19 questions designed to solicit your thoughts regarding various contracted services to which NPS is currently subscribed. For the following 4 questions, please provide information regarding the stakeholder category to which you belong and your military status/experience. If you desire additional information regarding the background of the services discussed within this survey, please visit <http://www.angelfire.com/electronic2/servicesurvey/survey.doc>. Thank you for contributing of your time in this important matter.

1. Please identify the stakeholder category to which you belong here at the Naval Postgraduate School.

- Student
- Faculty
- Staff

2. If you are a member of the military community, please select one of the following that is the most appropriate.

- Currently active duty
- Currently inactive reserves
- Prior military experience
- Retired military
- Not applicable

3. If you have any military experience, please select your branch of service.

- Navy
- Marine Corps
- Army
- Air Force
- Coast Guard

- Not applicable
 - Other (please comment)
4. If you are currently serving in the military or have had any military experience, please select the range that contains the highest paygrade you have attained.
- O-7 and above
 - O-4 through O-6
 - O-1 through O-3
 - E-7 and above
 - E-4 through E-6
 - E-1 through E-3
 - Not applicable

The Naval Postgraduate School is facing a reduction in current service funding of 25%. This equates to a reduction of \$540,000 from the FY06 budget. The following questions describe the services NPS currently funds. Unless otherwise instructed, please rate the level of importance you place upon each of these services. If you believe a particular service is very important and significantly impacts your quality of life on campus, answer with a rating of "5". If you believe that a particular service is unimportant and has little to no impact upon your quality of life on campus, answer with a rating of "1". If you are indifferent, answer with a rating of "3". Your honest feedback will enrich the decision-making process to ensure critical service contracts are retained at NPS.

5. NPS pays \$1,000 per month (\$12,000 per year) for the goose population on campus to be corralled in and around the lake area by use of specially trained canines. The intent is to reduce the amount of geese droppings around those areas of campus most frequented by pedestrian foot traffic. How important is it to you to retain this service?

Very important	Indifferent	Not important
5	4	3
		2
		1

6. NPS pays \$20,000 annually for general pest control services. This is geared towards the control of pests such as ants, cockroaches, spiders, etc. within NPS facilities. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
		2
		1

7. Regarding the general pest control services NPS receives, do you believe that the existing level of services is effective, based solely upon your experience here at NPS? In other words, have you observed an inordinate amount of pests lurking around NPS facilities in spite of the routine pest control services?

Very Effective	Indifferent	Not Effective
5	4	3
		2
		1

NPS is responsible for the grounds maintenance of approximately 51.2 acres of land. This area encompasses the NPS campus, Fleet Numerical Meteorology &

Oceanography Center, teen and child development centers, and the La Mesa softball field. NPS itemizes the level of maintenance performed to these areas into four categories listed in order of decreasing care requirements and cost: Prestige, Improved, Semi-Improved, and Unimproved.

8. Under consideration is a downgrade of the "Prestige" areas to "Improved" areas. This would save an estimated \$45K annually. However, it would alter the overall campus appearance. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
		2
		1

9. Another consideration is to reduce the level of service provided for all "Improved" areas. This would save NPS approximately \$50K annually. However, this would alter the overall campus appearance. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
		2
		1

10. Another consideration to reduce grounds maintenance expenses is to reduce the level of service provided to maintain the La Mesa Ballfield (such as reducing lawn mowing periodicity and infield upkeep). This would save NPS \$15K annually. However, the overall appearance of the ballfield will be degraded. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
		2
		1

NPS spends approximately \$1.152 million annually for custodial services. The existing contract provides standard custodial service for most facilities on the NPS campus, the teen center, child development center, base gym and bath house, and King and Melville auditoriums. Presently, custodial services are provided for office spaces, classrooms, labs, study and conference rooms, and common areas within NPS facilities.

11. Custodial maintenance of campus facilities is the single greatest annual service contract expense incurred by NPS. Hence, numerous recommendations for cost savings in this category are currently under consideration. One recommendation is to eliminate the weekly trash/recycle pickup from office spaces. Instead, centrally located trash and recycle bins will be provided on every floor of NPS facilities. Faculty and staff members would be responsible for emptying their respective trash containers into the central trash receptacles. This initiative would help NPS save \$10K annually. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
		2
		1

12. Another custodial service cost-saving consideration is the elimination of monthly floor cleaning for office spaces. This would require faculty and staff to conduct this service. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
	2	1

13. Another consideration is the reduction of chalkboard cleaning periodicity from weekly to bi-weekly. This measure would save NPS \$52K annually. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
	2	1

14. In conjunction with the previous question, a proposal is under consideration to discontinue all contracted dry-erase board cleaning for classrooms, labs, and study and conference rooms. This would require students from the last class to occupy each classroom daily to clean the boards. Class leaders would generate a watchbill rotation schedule to ensure unbiased fairness. This would save NPS \$44.5K annually. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
	2	1

15. If you are an NPS student, how willing would you be to clean classroom dry-erase boards in an effort to help NPS save money?

Very Willing	Indifferent	Not Willing or Not a Student
5	4	3
	2	1

16. A proposal is under consideration to discontinue contracted trash removal from classrooms, labs, and learning resource centers. Instead, students from the last class would remove the trash to the centrally located trash bins on each floor. Class leaders would generate a watchbill rotation schedule to ensure unbiased fairness. This initiative would save NPS \$19K annually. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important
5	4	3
	2	1

17. If you are an NPS student, how willing would you be to empty trash from your classroom at the end of the day to help NPS save money?

Very Willing	Indifferent	Not Willing or Not a Student
5	4	3
	2	1

18. Another proposal under consideration is to reduce the contracted floor cleaning in the classrooms, labs, and learning resource centers from twice weekly to once weekly. This would save NPS \$81K annually. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important		
5	4	3	2	1

19. A final recommendation is to reduce the frequency of cleaning services provided for "low-use" restrooms. The exact criteria by which restrooms may be deemed "low-use" has not been finalized, although all restrooms falling under this category will still be fully restocked with sanitary products daily. This would save NPS \$100K annually. How important is it to you to retain the current level of service?

Very important	Indifferent	Not important		
5	4	3	2	1

This concludes the survey. Thank you for taking the time to provide us your valued input. Your opinions and recommendations will be used to make contract services value determinations and ultimately decisions that will directly impact you, the stakeholders. Please feel free to use the space provided below to insert any additional comments or recommendations you believe are pertinent in aiding NPS in reducing contract services expenses or any other cost-savings measures. Have a great day!

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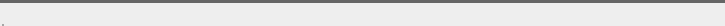
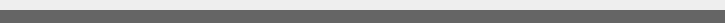


APPENDIX B. SURVEY RESPONSE INFORMATION

Introduction/Respondent Information


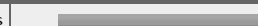





1. Please identify the stakeholder category to which you belong here at the Naval Postgraduate School.

		Response Percent	Response Total
Student		89.4%	361
Faculty		4.7%	19
Staff		6.2%	25
Total Respondents			404
(skipped this question)			0

2. If you are a member of the military community, please select one of the following that is the most appropriate.

		Response Percent	Response Total
Currently active duty		91.3%	369
Currently inactive reserves		0.5%	2
Prior military experience		0.7%	3
Retired military		2%	8
Not applicable		5.4%	22
Total Respondents			404
(skipped this question)			0

3. If you have any military experience, please select your branch of service.

		Response Percent	Response Total
Navy		57.7%	233
Marine Corps		15.1%	61
Army		6.4%	26
Air Force		14.6%	59
Coast Guard		0.2%	1
Not applicable		5.2%	21
Other (please specify)	 View	1.5%	6
Total Respondents			404

4. If you are currently serving in the military or have had any military experience, please select the range that contains the highest paygrade you have attained.			
		Response Percent	Response Total
O-7 and above		0%	0
O-4 through O-6		35.9%	145
O-1 through O-3		56.9%	230
E-7 and above		0.2%	1
E-4 through E-6		1%	4
E-1 through E-3		0.7%	3
Not applicable		5.2%	21
Total Respondents			404
(skipped this question)			0

3. Pest Control Services

5. NPS pays \$1,000 per month (\$12,000 per year) for the goose population on campus to be corralled in and around the lake area by use of specially trained canines. The intent is to reduce the amount of geese droppings around those areas of campus most frequented by pedestrian foot traffic. How important is it to you to retain this service?						
	Not Important		Indifferent		Very Important	Response Average
Goose dropping control.	36% (143)	16% (65)	20% (79)	21% (84)	8% (31)	2.49
Total Respondents						402
(skipped this question)						2

6. NPS pays \$20,000 annually for general pest control services. This is geared towards the control of pests such as ants, cockroaches, spiders, etc. within NPS facilities. How important is it to you to retain the current level of service?						
	Not Important		Indifferent		Very Important	Response Average
General pest control.	5% (20)	4% (18)	11% (45)	40% (159)	40% (160)	4.05
Total Respondents						402
(skipped this question)						2

7. Regarding the general pest control services NPS receives, do you believe that the existing level of services is effective, based solely upon your experience here at NPS? In other words, have you observed an inordinate amount of pests lurking around NPS facilities in spite of the routine pest control services?

	Not Effective		Indifferent		Very Effective	Response Average
Effectiveness of pest control.	9% (37)	13% (51)	11% (44)	29% (117)	38% (153)	3.74
Total Respondents						402
(skipped this question)						2

4. Grounds Maintenance.

8. Under consideration is a downgrade of the "Prestige" areas to "Improved" areas. This would save an estimated \$45K annually. However, it would alter the overall campus appearance. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain "Prestige" level of service.	17% (69)	15% (61)	25% (102)	26% (103)	17% (68)	3.10
Total Respondents						402
(skipped this question)						2

9. Another consideration is to reduce the level of service provided for all "Improved" areas. This would save NPS approximately \$50K annually. However, this would alter the overall campus appearance. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain "Improved" level of service.	11% (46)	15% (59)	28% (112)	32% (128)	14% (58)	3.23
Total Respondents						402
(skipped this question)						2

10. Another consideration to reduce grounds maintenance expenses is to reduce the level of service provided to maintain the La Mesa Ballfield (such as reducing lawn mowing periodicity and infield upkeep). This would save NPS \$15K annually. However, the overall appearance of the ballfield will be degraded. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain La Mesa Ballfield level of service.	43% (172)	14% (57)	23% (91)	11% (45)	9% (38)	2.31
Total Respondents						402
(skipped this question)						2

5. Custodial Services.

11. Custodial maintenance of campus facilities is the single greatest annual service contract expense incurred by NPS. Hence, numerous recommendations for cost savings in this category are currently under consideration. One recommendation is to eliminate the weekly trash/recycle pickup from office spaces. Instead, centrally located trash and recycle bins will be provided on every floor of NPS facilities. Faculty and staff members would be responsible for emptying their respective trash containers into the central trash receptacles. This initiative would help NPS save \$20K annually. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain trash removal level of service.	35% (139)	17% (67)	18% (72)	12% (49)	18% (72)	2.62
Total Respondents						395
(skipped this question)						9

12. Another custodial service cost-saving consideration is the elimination of monthly floor cleaning for office spaces. This would require faculty and staff to conduct this service. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain office floor cleaning level of service.	27% (107)	10% (40)	18% (72)	24% (97)	21% (83)	3.02
Total Respondents						395
(skipped this question)						9

13. Another consideration is the reduction of chalkboard cleaning periodicity from weekly to bi-weekly. This measure would save NPS \$52K annually. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain chalkboard cleaning level of service.	57% (227)	15% (61)	11% (45)	8% (33)	8% (33)	1.96
Total Respondents						395
(skipped this question)						9

14. In conjunction with the previous question, a proposal is under consideration to discontinue all contracted dry-erase board cleaning for classrooms, labs, and study and conference rooms. This would require students from the last class to occupy each classroom daily to clean the boards. Class leaders would generate a watchbill rotation schedule to ensure unbiased fairness. This would save NPS \$44.5K annually. How important is it to you to retain the current level of service?						
	Not Important		Indifferent		Very Important	Response Average
Retain dry-erase board level of service.	46% (182)	13% (50)	15% (61)	11% (42)	16% (64)	2.39
Total Respondents						395
(skipped this question)						9

15. If you are an NPS student, how willing would you be to clean classroom dry-erase boards in an effort to help NPS save money?						
	Not Willing or Not a Student		Indifferent		Very Willing	Response Average
Willing to clean dry-erase boards?	26% (102)	10% (39)	16% (64)	21% (82)	28% (112)	3.16
Total Respondents						395
(skipped this question)						9

16. A proposal is under consideration to discontinue contracted trash removal from classrooms, labs, and learning resource centers. Instead, students from the last class would remove the trash to the centrally located trash bins on each floor. Class leaders would generate a watchbill rotation schedule to ensure unbiased fairness. This initiative would save NPS \$19K annually. How important is it to you to retain the current level of service?						
	Not Important		Indifferent		Very Important	Response Average
Retain classroom trash removal level of service.	22% (88)	14% (54)	19% (75)	20% (79)	26% (103)	3.14
Total Respondents						395
(skipped this question)						9

17. If you are an NPS student, how willing would you be to empty trash from your classroom at the end of the day to help NPS save money?						
	Not Willing or Not a Student		Indifferent		Very Willing	Response Average
Willing to empty trash from classrooms?	33% (130)	13% (50)	16% (65)	18% (72)	21% (82)	2.81
Total Respondents						395
(skipped this question)						9

18. Another proposal under consideration is to reduce the contracted floor cleaning in the classrooms, labs, and learning resource centers from twice weekly to once weekly. This would save NPS \$81K annually. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain classroom floor cleaning level of service.	36% (142)	18% (70)	18% (72)	15% (59)	14% (56)	2.54
Total Respondents						395
(skipped this question)						9

19. A final recommendation is to reduce the frequency of cleaning services provided for "low-use" restrooms. The exact criteria by which restrooms may be deemed "low-use" has not been finalized, although all restrooms falling under this category will still be fully restocked with sanitary products daily. This would save NPS \$100K annually. How important is it to you to retain the current level of service?

	Not Important		Indifferent		Very Important	Response Average
Retain "low-use" restroom level of cleaning service.	21% (82)	13% (53)	17% (68)	20% (80)	29% (116)	3.24
Total Respondents						395
(skipped this question)						9

6. Conclusion.

20. Please include comments here.

View Total Respondents	170
(skipped this question)	234

APPENDIX C. CRYSTAL BALL SOLUTION TO SERVICE CONTRACTS REDUCTION PROBLEM

KNAPSACK MODEL

Decision Variables		Remove From Budget	Keep in Budget	Variable Dealt With (1=YES)	Cost	Value
1	Provide Geese Control	0	1	1	\$12,000	3
2	Provide Pest Control	0	1	1	\$20,000	5
3	Grounds Keeping - Prestige to Improved	1	0	1	\$45,000	2
4	Grounds Keeping - Improved to Semi-improved	1	0	1	\$50,000	2
5	Maintain La Mesa Ballfield Conditions	0	1	1	\$15,000	4
6	Change Office Trash Location	1	0	1	\$10,000	1
7	Reduce Chalkboard Cleaning Frequency	1	0	1	\$52,000	1
8	Reduce Dry-erase board Cleaning Frequency	1	0	1	\$44,500	1
9	Change Classroom Trash Location	0	1	1	\$19,000	4
10	Reduce Classroom Floor Cleaning Frequency	0	1	1	\$81,000	3
11	Reduce Bathroom Cleaning Service Frequency	1	0	1	\$100,000	4
Constraints						
Budgetary Savings > \$270,000		\$301,500			>=	\$293,000
Services must be removed, or kept in budget						
Binary						
Non-negative						
Objective Function						
Maximise Value of services left in budget						19

Value = 5 is most important, 1 is least important

Steps:

1. Decide upon decision variables. These are the different service contracts that can be kept in the budget or removed from the budget
2. Assign values to each of the contracts (based on personal opinion)
3. Assign costs to each of the contracts (given by NPS)
4. Set up the constraints such that the value of those contracts removed from the budget must be greater than the desired savings by NPS
5. Set up the constraints such that Solver can either keep a service contract, or remove a service contract, but not both.
6. Set up the objective function to be maximising the value of service contracts that are kept in the budget.
7. Run solver, making all decision variables binary and non-negative

Microsoft Excel 11.0 Answer Report
Worksheet: [business modelling report.xls]NPS services contract
Report Created: 8/29/2005 10:22:07 AM

Target Cell (Max)

Cell	Name	Original Value	Final Value
\$C\$26	Maximise Value of services left in budget Remove From Budget	0	19

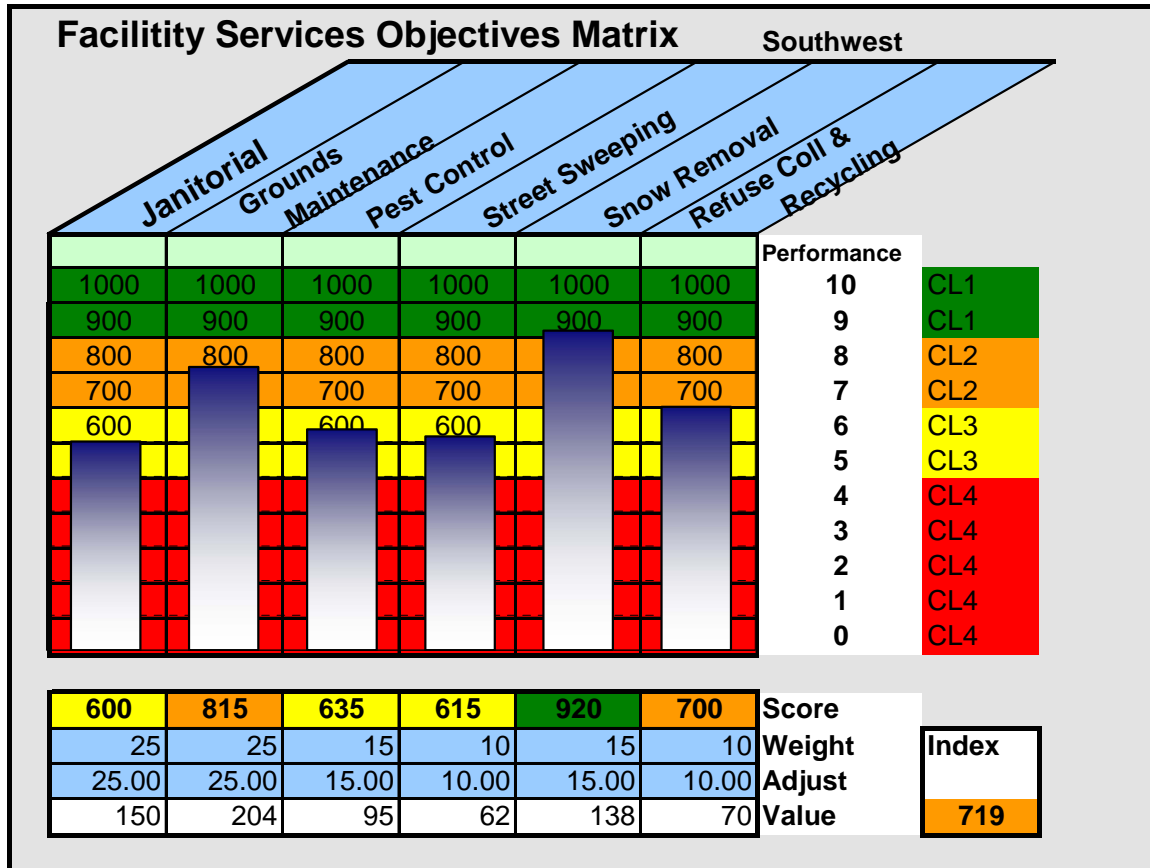
Adjustable Cells

Cell	Name	Original Value	Final Value
\$C\$6	Provide Geese Control Remove From Budget	0	0
\$D\$6	Provide Geese Control Keep in Budget	0	1
\$C\$7	Provide Pest Control Remove From Budget	0	0
\$D\$7	Provide Pest Control Keep in Budget	0	1
\$C\$8	Grounds Keeping - Prestige to Improved Remove From Budget	0	1
\$D\$8	Grounds Keeping - Prestige to Improved Keep in Budget	0	0
\$C\$9	Grounds Keeping - Improved to Semi-improved Remove From Budget	0	1
\$D\$9	Grounds Keeping - Improved to Semi-improved Keep in Budget	0	0
\$C\$10	Maintain La Mesa Ballfield Conditions Remove From Budget	0	0
\$D\$10	Maintain La Mesa Ballfield Conditions Keep in Budget	0	1
\$C\$11	Change Office Trash Location Remove From Budget	0	1
\$D\$11	Change Office Trash Location Keep in Budget	0	0
\$C\$12	Reduce Chalkboard Cleaning Frequency Remove From Budget	0	1
\$D\$12	Reduce Chalkboard Cleaning Frequency Keep in Budget	0	0
\$C\$13	Reduce Dry-erase board Cleaning Frequency Remove From Budget	0	1
\$D\$13	Reduce Dry-erase board Cleaning Frequency Keep in Budget	0	0
\$C\$14	Change Classroom Trash Location Remove From Budget	0	0
\$D\$14	Change Classroom Trash Location Keep in Budget	0	1
\$C\$15	Reduce Classroom Floor Cleaning Frequency Remove From Budget	0	0
\$D\$15	Reduce Classroom Floor Cleaning Frequency Keep in Budget	0	1
\$C\$16	Reduce Bathroom Cleaning Service Frequency Remove From Budget	0	1
\$D\$16	Reduce Bathroom Cleaning Service Frequency Keep in Budget	0	0

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
\$C\$20	Budgetary Savings > \$270,000 Remove From Budget	\$301,500	\$C\$20>=\$G\$20	Not Binding	\$8,500
\$E\$6	Provide Geese Control Variable Dealt With (1=YES)	1	\$E\$6=1	Not Binding	0
\$E\$7	Provide Pest Control Variable Dealt With (1=YES)	1	\$E\$7=1	Not Binding	0
\$E\$8	Grounds Keeping - Prestige to Improved Variable Dealt With (1=YES)	1	\$E\$8=1	Not Binding	0
\$E\$9	Grounds Keeping - Improved to Semi-improved Variable Dealt With (1=YES)	1	\$E\$9=1	Not Binding	0
\$E\$10	Maintain La Mesa Ballfield Conditions Variable Dealt With (1=YES)	1	\$E\$10=1	Not Binding	0
\$E\$11	Change Office Trash Location Variable Dealt With (1=YES)	1	\$E\$11=1	Not Binding	0
\$E\$12	Reduce Chalkboard Cleaning Frequency Variable Dealt With (1=YES)	1	\$E\$12=1	Not Binding	0
\$E\$13	Reduce Dry-erase board Cleaning Frequency Variable Dealt With (1=YES)	1	\$E\$13=1	Not Binding	0
\$E\$14	Change Classroom Trash Location Variable Dealt With (1=YES)	1	\$E\$14=1	Not Binding	0
\$E\$15	Reduce Classroom Floor Cleaning Frequency Variable Dealt With (1=YES)	1	\$E\$15=1	Not Binding	0
\$E\$16	Reduce Bathroom Cleaning Service Frequency Variable Dealt With (1=YES)	1	\$E\$16=1	Not Binding	0
\$C\$6	Provide Geese Control Remove From Budget	0	\$C\$6=binary	Binding	0
\$D\$6	Provide Geese Control Keep in Budget	1	\$D\$6=binary	Binding	0
\$C\$7	Provide Pest Control Remove From Budget	0	\$C\$7=binary	Binding	0
\$D\$7	Provide Pest Control Keep in Budget	1	\$D\$7=binary	Binding	0
\$C\$8	Grounds Keeping - Prestige to Improved Remove From Budget	1	\$C\$8=binary	Binding	0
\$D\$8	Grounds Keeping - Prestige to Improved Keep in Budget	0	\$D\$8=binary	Binding	0
\$C\$9	Grounds Keeping - Improved to Semi-improved Remove From Budget	1	\$C\$9=binary	Binding	0
\$D\$9	Grounds Keeping - Improved to Semi-improved Keep in Budget	0	\$D\$9=binary	Binding	0
\$C\$10	Maintain La Mesa Ballfield Conditions Remove From Budget	0	\$C\$10=binary	Binding	0
\$D\$10	Maintain La Mesa Ballfield Conditions Keep in Budget	1	\$D\$10=binary	Binding	0
\$C\$11	Change Office Trash Location Remove From Budget	1	\$C\$11=binary	Binding	0
\$D\$11	Change Office Trash Location Keep in Budget	0	\$D\$11=binary	Binding	0
\$C\$12	Reduce Chalkboard Cleaning Frequency Remove From Budget	1	\$C\$12=binary	Binding	0
\$D\$12	Reduce Chalkboard Cleaning Frequency Keep in Budget	0	\$D\$12=binary	Binding	0
\$C\$13	Reduce Dry-erase board Cleaning Frequency Remove From Budget	1	\$C\$13=binary	Binding	0
\$D\$13	Reduce Dry-erase board Cleaning Frequency Keep in Budget	0	\$D\$13=binary	Binding	0
\$C\$14	Change Classroom Trash Location Remove From Budget	0	\$C\$14=binary	Binding	0
\$D\$14	Change Classroom Trash Location Keep in Budget	1	\$D\$14=binary	Binding	0
\$C\$15	Reduce Classroom Floor Cleaning Frequency Remove From Budget	0	\$C\$15=binary	Binding	0
\$D\$15	Reduce Classroom Floor Cleaning Frequency Keep in Budget	1	\$D\$15=binary	Binding	0
\$C\$16	Reduce Bathroom Cleaning Service Frequency Remove From Budget	1	\$C\$16=binary	Binding	0
\$D\$16	Reduce Bathroom Cleaning Service Frequency Keep in Budget	0	\$D\$16=binary	Binding	0

APPENDIX D. SERVICE CONTRACTS VALUATION DATA USED BY NAVAL REGION SOUTHWEST



	Answer	Score	Weight	Score
Janitorial				10 CL1
1. How many times per month is your carpet vacuumed, floors dust mopped and/or swept?	4.1	7	20	9 CL1
2. How many times per year are your carpets/rugs deep cleaned or floors stripped and waxed?	1.0	5	5	8 CL2
3. How many times per quarter are your floors damp mopped? (not in restrooms)	6.4	7	5	7 CL2
4. How many times per week are your restrooms cleaned and serviced?	4.7	6	30	6 CL3
5. How many times per week are your waste containers emptied?	2.5	5	20	5 CL3
6. How many times per week is there a special cleaning (Kitchens, Coffee Mess, Fountains)?	3.4	7	10	4 CL4
7. How many times per year are your windows cleaned (Interior and Exterior)?	0.7	0	5	2 CL4
8. What percent of Janitorial work is inspected by QAE/PAR?	31.3	10	5	1 CL4
			600	0 CL4
Grounds Maintenance				
1. How many times per quarter is turf care completed?	6.8	7	25	
2. How many times per quarter is irrigation maintenance completed?	3.7	5	10	
3. How many times per year is fertilization applied?	2.0	7	10	
4. How many times per year is pest control applied?	11.3	10	10	
5. How many times per year is vegetation control completed?	13.0	10	10	
6. How many times per year is thatching, aeration, top dressing and reseeding completed?	1.6	9	5	
7. How many times per month is litter removal completed?	3.5	8	10	
8. How many times per year is weed control applied?	9.9	10	10	
9. How many times per year is turf/ornamental vegetation – pest control completed?	9.7	9	5	
10. What percent of Grounds Maintenance work is inspected by QAE/PAR?	31.1	10	5	
			815	
Pest Control				
1. How many times per year is surveillance completed?	6.9	7	30	
2. How many times per month is roach control in the galleys completed?	1.7	5	20	
3. How many times per year is mosquito abatement completed?	1.4	4	10	
4. How many times per year is termite/wood-boring insect control completed?	0.8	4	15	
5. How many times per year is nuisance insects control (ants, bees, etc.) completed?	13.6	10	10	
6. How many times per year is rodent control completed?	12.0	9	10	
7. What percent of Pest Control work is inspected by QAE/PAR?	8.5	7	5	
			635	
Street Sweeping				
1. How many times per year is street sweeping completed on primary roads?	29.2	10	20	
2. How many times per year is street sweeping completed on secondary roads?	6.9	7	10	
3. How many times per year is street sweeping completed on parking lots?	11.3	9	5	
4. Within many hours is airfield runway and taxiway sweeping initiated?	0.3	0	30	
5. How many times per year is the airfield-parking apron swept?	13.9	8	20	
6. How many times per year are airfield-support roads swept?	14.2	9	10	
7. What percent of Street Sweeping is inspected by QAE/PAR?	17.8	10	5	
			615	
Snow Removal				
1. Within how many hours is snow removal initiated for primary roads/emergency routes and primary sidewalks?	1.9	10	20	
2. Within how many hours is snow removal initiated for secondary roads and sidewalks?	5.4	10	10	
3. Within how many hours is snow removal initiated for parking lots?	5.4	10	5	
4. Within how many hours is snow removal initiated for runways and taxiways?	1.1	9	30	
5. Within how many hours is snow removal initiated for airfield parking aprons?	1.1	10	20	
6. Within how many hours is snow removal initiated for airfield support roads?	5.4	10	10	
7. What percent of Snow Removal is inspected by QAE/PAR?	0.0	0	5	
			920	
Refuse Collection & Recycling				
1. How many times per week are dumpsters emptied in food areas and medical waste dumpsters?	3.3	7	40	
2. How many times per month are dumpsters emptied in all other areas?	6.0	9	30	
3. What percent did you exceed your required diversion in recycling (IAW solid waste management plan) at your command?	2.8	4	25	
4. What percent of Refuse Collection & Recycling is inspected by QAE/PAR?	25.2	10	5	
			700	

Southwest

	EL CENTRO CA	FALLON NV	LEMOORE CA	NORTH ISLAND	CHINA LAKE CA	VENTURA CTY P	MONTEREY CA	SUBBASE SAND	CORONA CA	SEAL BEACH CA	SAN DIEGO CA				Result
Weighting Factor	3	5	7	23	5	17	8	5	5	5	17				100
Janitorial															
1. How many times per month is your carpet vacuumed, floors dust mopped and/or swept?	8	8	4	4	4	4	1	4	4	4	4				4.1
2. How many times per year are your carpets/rugs deep cleaned or floors stripped and waxed?	2	2	1	1	1	1	0	1	1	1	1				1.0
3. How many times per quarter are your floors damp mopped? (not in restrooms)	12	8	12	1	3	12	3	12	12	9	3				6.4
4. How many times per week are your restrooms cleaned and serviced?	2	5	5	5	8	3	5	5	5	4	5				4.7
5. How many times per week are your waste containers emptied?	2	2	1	2	4	1	1	2	5	3	5				2.5
6. How many times per week is there a special cleaning (Kitchens, Coffee Mess, Fountains)?	1	1	1	5	4	1	3	5	5	3	5				3.4
7. How many times per year are your windows cleaned (Interior and Exterior)?	10	0	0	0	0	1	0	0	1	1	1				0.7
8. What percent of Janitorial work is inspected by QAE/PAR?	5	0	100	50	2	30	8	30	50	45	3				31.3
Grounds Maintenance															
1. How many times per quarter is turf care completed?	8	8	4	6	12	8	3	3	0	2	12				6.8
2. How many times per quarter is irrigation maintenance completed?	4	2	12	6	0	1	3	3	0	3	3				3.7
3. How many times per year is fertilization applied?	1	1	0	2	1	3	2	1	0	1	4				2.0
4. How many times per year is pest control applied?	0	1	52	26	0	1	1	12	0	2	4				11.3
5. How many times per year is vegetation control completed?	3	0	0	26	4	8	4	12	0	8	24				13.0
6. How many times per year is thatching, aeration, top dressing and reseeding completed?	0	1	0	4	1	1	0	1	0	1	2				1.6
7. How many times per month is litter removal completed?	2	2	2	4	4	2	3	12	0	4	4				3.5
8. How many times per year is weed control applied?	3	2	19	26	0	4	0	12	1	8	4				9.9
9. How many times per year is turf/ornamental vegetation – pest control completed?	0	1	0	26	0	12	2	12	0	4	4				9.7
10. What percent of Grounds Maintenance work is inspected by QAE/PAR?	10	0	100	50	10	30	10	50	0	50	5				31.1
Pest Control															
1. How many times per year is surveillance completed?	12	12	24	0	0	10	12	0	0	32	0				6.9
2. How many times per month is roach control in the galleys completed?	4	4	0	0	0	2	1	12	0	3	1				1.7
3. How many times per year is mosquito abatement completed?	6	6	1	0	0	3	0	0	0	6	0				1.4
4. How many times per year is termite/wood-boring insect control completed?	2	0	0	0	0	1	0	11	0	0	0				0.8
5. How many times per year is nuisance insects control (ants, bees, etc.) completed?	8	6	40	0	0	12	4	138	0	6	4				13.6
6. How many times per year is rodent control completed?	2	12	100	0	0	4	12	33	0	8	4				12.0
7. What percent of Pest Control work is inspected by QAE/PAR?	3	0	1	0	30	10	0	0	33	0					8.5
Street Sweeping															
1. How many times per year is street sweeping completed on primary roads?	24	0	36	12	24	52	12	48	12	7	52				29.2
2. How many times per year is street sweeping completed on secondary roads?	12	0	26	0	0	0	4	0	0	0	26				6.9
3. How many times per year is street sweeping completed on parking lots?	12	0	2	0	6	0	1	12	12	7	52				11.3
4. Within how many hours is airfield runway and taxiway sweeping initiated?	1	1	1	0	2	0	0	0	0	0	0				0.3
5. How many times per year is the airfield-parking apron swept?	24	200	24	4	12	0	0	0	0	0	0				13.9
6. How many times per year are airfield-support roads swept?	24	200	36	4	0	0	0	0	0	0	0				14.2
7. What percent of Street Sweeping is inspected by QAE/PAR?	4	0		25	20	30	0	20	50	5	5				17.8
Snow Removal															
1. Within how many hours is snow removal initiated for primary roads/emergency routes and primary sidewalks?	0	2		24	0	0	0	0	0	0	0				1.9
2. Within how many hours is snow removal initiated for secondary roads and sidewalks?	0	4		72	0	0	0	0	0	0	0				5.4
3. Within how many hours is snow removal initiated for parking lots?	0	4		72	0	0	0	0	0	0	0				5.4
4. Within how many hours is snow removal initiated for runways and taxiways?	0	4		12	0	0	0	0	0	0	0				1.1
5. Within how many hours is snow removal initiated for airfield parking aprons?	0	4		12	0	0	0	0	0	0	0				1.1
6. Within how many hours is snow removal initiated for airfield support roads?	0	4		72	0	0	0	0	0	0	0				5.4
7. What percent of Snow Removal is inspected by QAE/PAR?	0	0		0	0	0	0	0	0	0	0				0.0
Refuse Collection & Recycling															
1. How many times per week are dumpsters emptied in food areas and medical waste dumpsters?	2.5	3	6	3	3	5	3	6	1	1	2				3.3
2. How many times per month are dumpsters emptied in all other areas?	4	2	15	10	1	3	7	12	4	3	2				6.0
3. What percent did you exceed your required diversion in recycling (IAW solid waste management plan) at your command?	0	0	0	0	0	10	3	0	0	0	5				2.8
4. What percent of Refuse Collection & Recycling is inspected by QAE/PAR?	10	0		50	0	30	10	1	50	51	4				25.2

Southwest

	EL CENTRO CA	FALLON NV	LEMOORE CA	NORTH ISLAND	CHINA LAKE CA	VENTURA CITY	MONTEREY CA	SUBBASE SAND	CORONA CA	SEAL BEACH CA	SAN DIEGO CA				Result
Weighting Factor	3	5	7	23	5	17	8	5	5	5	17				100
Janitorial	3	5	7	23	5	17	8	5	5	5	17	0	0	0	0
1. How many times per month is your carpet vacuumed, floors dust mopped and/or swept?	24	40	28	92	20	68	8	20	20	20	68				100
2. How many times per year are your carpets/rugs deep cleaned or floors stripped and waxed?	6	10	7	23	5	17	0	5	5	5	17				100
3. How many times per quarter are your floors damp mopped? (not in restrooms)	36	40	84	23	15	204	24	60	60	45	51				100
4. How many times per week are your restrooms cleaned and serviced?	6	25	35	115	40	51	40	25	25	20	85				100
5. How many times per week are your waste containers emptied?	6	10	7	46	20	17	8	10	25	15	85				100
6. How many times per week is there a special cleaning (Kitchens, Coffee Mess, Fountains)?	3	5	7	115	20	17	24	25	25	15	85				100
7. How many times per year are your windows cleaned (Interior and Exterior)?	30	0	0	0	0	17	0	0	5	5	17				100
8. What percent of Janitorial work is inspected by QAE/PAR?	15	0	700	1150	10	510	64	150	250	225	51				100
Grounds Maintenance	3	5	7	23	5	17	8	5	5	5	17	0	0	0	0
1. How many times per quarter is turf care completed?	24	40	28	138	60	136	24	15	0	10	204				100
2. How many times per quarter is irrigation maintenance completed?	12	10	84	138	0	17	24	15	0	15	51				100
3. How many times per year is fertilization applied?	3	5	0	46	5	51	16	5	0	5	68				100
4. How many times per year is pest control applied?	0	5	364	598	0	17	8	60	0	10	68				100
5. How many times per year is vegetation control completed?	9	0	0	598	20	136	32	60	0	40	408				100
6. How many times per year is thatching, aeration, top dressing and reseeding completed?	0	5	0	92	5	17	0	5	0	5	34				100
7. How many times per month is litter removal completed?	6	10	14	92	20	34	24	60	0	20	68				100
8. How many times per year is weed control applied?	9	10	133	598	0	68	0	60	5	40	68				100
9. How many times per year is turf/ornamental vegetation – pest control completed?	0	5	0	598	0	204	16	60	0	20	68				100
10. What percent of Grounds Maintenance work is inspected by QAE/PAR?	30	0	700	1150	50	510	80	250	0	250	85				100
Pest Control	3	5	7	23	5	17	8	5	5	5	17	0	0	0	0
1. How many times per year is surveillance completed?	36	60	168	0	0	170	96	0	0	160	0				100
2. How many times per month is roach control in the galleys completed?	12	20	0	0	0	34	8	60	0	15	17				100
3. How many times per year is mosquito abatement completed?	18	30	7	0	0	51	0	0	0	30	0				100
4. How many times per year is termite/wood-boring insect control completed?	6	0	0	0	0	17	0	55	0	0	0				100
5. How many times per year is nuisance insects control (ants, bees, etc.) completed?	24	30	280	0	0	204	32	690	0	30	68				100
6. How many times per year is rodent control completed?	6	60	700	0	0	68	96	165	0	40	68				100
7. What percent of Pest Control work is inspected by QAE/PAR?	9	0	0	23	0	510	80	0	0	165	0				93
Street Sweeping	3	5	7	23	5	17	8	5	5	5	17	0	0	0	0
1. How many times per year is street sweeping completed on primary roads?	72	0	252	276	120	884	96	240	60	35	884				100
2. How many times per year is street sweeping completed on secondary roads?	36	0	182	0	0	0	32	0	0	0	442				100
3. How many times per year is street sweeping completed on parking lots?	36	0	14	0	30	0	8	60	60	35	884				100
4. Within how many hours is airfield runway and taxiway sweeping initiated?	3	5	7	0	10	0	0	0	0	0	0				100
5. How many times per year is the airfield-parking apron swept?	72	1000	168	92	60	0	0	0	0	0	0				100
6. How many times per year are airfield-support roads swept?	72	1000	252	92	0	0	0	0	0	0	0				100
7. What percent of Street Sweeping is inspected by QAE/PAR?	12	0	0	575	100	510	0	100	250	25	85				93
Snow Removal	3	5	0	0	5	17	8	5	5	5	17	0	0	0	0
1. Within how many hours is snow removal initiated for primary roads/emergency routes and primary sidewalks?	0	10		120	0	0	0	0	0	0	0				70
2. Within how many hours is snow removal initiated for secondary roads and sidewalks?	0	20		360	0	0	0	0	0	0	0				70
3. Within how many hours is snow removal initiated for parking lots?	0	20		360	0	0	0	0	0	0	0				70
4. Within how many hours is snow removal initiated for runways and taxiways?	0	20		60	0	0	0	0	0	0	0				70
5. Within how many hours is snow removal initiated for airfield parking aprons?	0	20		60	0	0	0	0	0	0	0				70
6. Within how many hours is snow removal initiated for airfield support roads?	0	20		360	0	0	0	0	0	0	0				70
7. What percent of Snow Removal is inspected by QAE/PAR?	0	0		0	0	0	0	0	0	0	0				70
Refuse Collection & Recycling	3	5	7	23	5	17	8	5	5	5	17	0	0	0	0
1. How many times per week are dumpsters emptied in food areas and medical waste dumpsters?	7.5	15	42	69	15	85	24	30	5	5	34				100
2. How many times per month are dumpsters emptied in all other areas?	12	10	105	230	5	51	56	60	20	15	34				100
3. What percent did you exceed your required diversion in recycling (IAW solid waste management plan) at your command?	0	0	0	0	0	170	24	0	0	0	85				100
4. What percent of Refuse Collection & Recycling is inspected by QAE/PAR?	30	0	0	1150	0	510	80	5	250	255	68				93

Janitorial								
1. How many times per month is your carpet vacuumed, floors dust mopped and/or swept?	2. How many times per year is your carpet/rugs deep cleaned or floors stripped and waxed?	3. How many times per quarter are your floors damp mopped? (not in restrooms)	4. How many times per week are your restrooms cleaned and serviced?	5. How many times per week are your waste containers emptied?	6. How many times per week is there a special cleaning (Kitchens, Coffee Mess, Fountains)?	7. How many times per year are your windows cleaned (Interior and Exterior)?	8. How much of the time are QAE/PAR Inspections completed?	
0	0	0	0	0	0	0	0	0
							1	1
		1	1				2	2
							3	3
1		2	2	1	1		4	4
2	1	3	3	2	2	1	5	5
3		4	4				6	6
4	2	6	5	3	3	2	8	7
10	3	10	7	4	4	3	9	8
20	4	12	10	5	5	4	10	9
21	5	15	12	8	8	5	11	10

Grounds Maintenance

1. How many times per quarter is turf care completed?	2. How many times per quarter is irrigation maintenance completed?	3. How many times per year is fertilization applied?	4. How many times per year is pest control applied?	5. How many times per year is vegetation control completed?	6. How many times per year is thatching, aeration, top dressing and reseeding completed?	7. How many times per month is litter removal completed?	8. How many times per year is weed control applied?	9. How many times per year is turf/ ornamental vegetation – pest control completed?	10. How much of the time are QAE/PAR Inspections completed?	
0	0								0	0
									1	1
									2	2
									3	3
1	1	0	0	0	0	0	0	0	4	4
3	3	1	1	1		1	1	1	5	5
4	4								6	6
6	6	2	2	2		2	2		8	7
10	10	3	3	3		3	3		9	8
12	12	4	4	4	1	4	4	2	10	9
13	13	5	5	5		5	5		11	10

Pest Control

1. How many times per year is surveillance completed?	2. How many times per month is roach control in the galleys completed?	3. How many times per year is mosquito abatement completed?	4. How many times per year is termite/ wood-boring insect control completed?	5. How many times per year is nuisance insects control (ants, bees, etc.) completed?	6. How many times per year is rodent control completed?	7. How much of the time are QAE/PAR Inspections completed?	
						0	0
						1	1
						2	2
						3	3
0	0	0	0	0	0	4	4
1	1	3		1	1	5	5
2				2	2	6	6
4	2	6	1	4	4	8	7
8	3	9		8	8	9	8
12	4	12	2	12	12	10	9
13	5	13		13	13	11	10

Street Sweeping

1. How many times per year is street sweeping completed on primary roads?	2. How many times per year is street sweeping completed on secondary roads?	3. How many times per year is street sweeping completed on parking lots?	4. Within many hours is airfield runway and taxiway sweeping initiated?	5. How many times per year is the airfield-parking apron swept?	6. How many times per year are support roads swept?	7. How much of the time are QAE/PAR Inspections completed?		
0	0		0	0	0	0	0	10
			1	1		1	1	9
1			2	2		2	2	8
2				3		3	3	7
3	1	0	4	4	1	4	4	6
4	2	1		5	2	5	5	5
6	3		8	6	3	6	6	4
8	4	2		8	4	8	7	3
12	8		24	12	8	9	8	2
18	12	4		18	12	10	9	1
24	24		48	24	24	11	10	0

Snow Removal

1. Within how many hours is snow removal initiated for primary roads/emergency routes and primary sidewalks?	2. Within how many hours is snow removal initiated for secondary roads and sidewalks?	3. Within how many hours is snow removal initiated for parking lots?	4. Within how many hours is snow removal initiated for runways and taxiways?	5. Within how many hours is snow removal initiated for airfield parking aprons?	6. Within how many hours is snow removal initiated for airfield support roads?	7. How much of the time are QAE/PAR Inspections completed?		
0	0	0	0	0	0	0	10	0
8	12	12	1	8	8	1	9	1
12	24	24	2	12	18	2	8	2
						3	7	3
16	36	36	4	16	24	4	6	4
						5	5	5
24	48	48	8	24	36	6	4	6
						8	3	7
48	72	72	24	48	48	9	2	8
						10	1	9
72				72	72	11	0	10

Refuse & Recycle

1. How many times per week are dumpsters emptied in food areas and medical waste dumpsters?	2. How many times per month are dumpsters emptied in all other areas?	3. How proficient is the Recycling (IAW solid waste management plan) at your command?	4. How much of the time are QAE/PAR Inspections completed?	
			0	0
			1	1
			2	2
			3	3
0	1	0	4	4
1	2	5	5	5
2	3	7	6	6
3	4	10	8	7
4		12	9	8
5	5	15	10	9
6	6	16	11	10

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